AMERICAN MACHINIST

A JOURNAL FOR MACHINISTS, ENGINEERS, FOUNDERS, BOILER MAKERS, PATTERN MAKERS AND BLACKSMITHS.

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New Measuring Tools.

We present engravings of three new tools of the "micrometer" type, made by A. J. Wilkinson & Co., 184 to 188 Washington Street, Boston, Mass.

The shifting screw micrometer has a capacity to measure from 0 to 3 inches in length or diameter. The micrometer screw has a range of one inch, and with this what is termed a shifting screw, cut five threads to the inch and graduated at every revolution, or two-tenths of an inch, is used. This shifting screw can be accurately and quickly changed.

To operate, observe the line *D* on arm of caliper and line *E F* on the shifting screw. Now, to change position of shifting screw for any measure desired, unclasp the grip-nut by moving lever *C*, then turn the shifting screw out or in, as the case may be, being careful to have the line *E F* coincide with line *D*. Secure with lever *C*, and the caliper is ready for measuring.

The micrometer screw is cut fifty threads to an inch, and measures one-fiftieth or 20 one-thousandths per revolution.

The micrometer indicating caliper is a combination of the micrometer screw and indicating arm. This arm multiplies any variation fifteen times, so that a minute variation is easily detected. This tool is especially designed as a standard inspection gauge in machine shops and factories, where a large number of pieces of a kind, such as taps, reamers, pieces of guns, watches, clocks, etc., are to be tested, but is also a useful tool in the hands of a workman.

The construction and operation is as follows: *A* is the frame, *B* the micrometer screw, *C* the shifting screw, *E* the multiplying or indicating arm, and *S* the stand. The tool is made of the most suitable material, and highly finished. Its most novel features are the shifting screw and multiplying arm. To operate the caliper, for example, it is desired to test 1,000 or more pieces supposed to be $1\frac{1}{4}$ inches in length. As the micrometer screw *B* will itself measure but one inch, it will be necessary to carry it back one inch by means of the shifting screw *C*, then set the micrometer screw at 250 one-thousandths or $\frac{1}{4}$ inch. Then, to measure, place the pieces between the two points *F* and *G* (the point *F* being the end of micrometer screw, and *G* one end of indicating arm). If the pieces are accurate, the test lines *H* and *I* will coincide; should there be any inaccuracy, however, it will be shown at *H*, fifteen times multiplied, and of course can be seen quickly with the naked eye. To discover the amount of variance, turn micrometer screw in or out and try as before. This instrument will measure from 0 to 3 inches.

The improved covered screw sheet metal gauge has a capacity up to $\frac{4}{10}$". It is adapted to the use of brass plate and wire mills; also to paper mills for gauging heavy sheets. The caliper can be held suspended and operated by one hand in a vertical position, at right angles to the sheet of metal or paper to be measured, and the measurements read while in this position. It is also a convenient tool for more general use.

Tools of the type of those shown are fast finding their way, not only into testing rooms and tool rooms, but into the hands of individual workmen.

Long Island Railroad Locomotives.

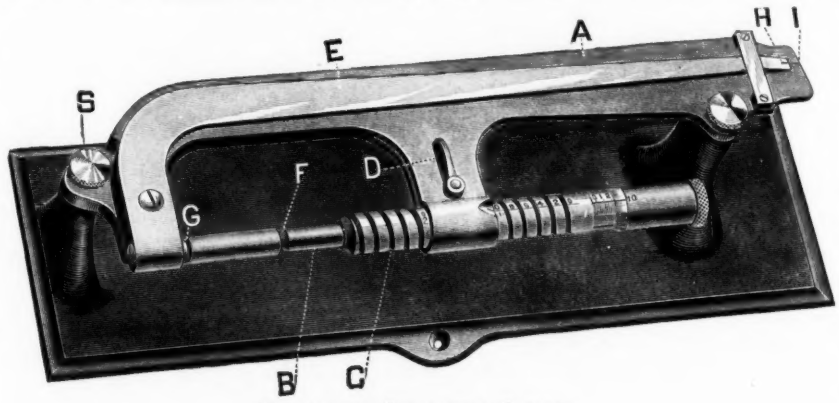
Railroad engineers who are opposed to the link motion, and find numerous objections to that method of distributing the steam in locomotives, have repeatedly commended the Walschaert motion as something very superior to the shifting link. On the Long Island Railroad there are many locomotives built by Mason with the Walschaert motion, and they have been working for years side by side with link-motion engines. There is no prejudice against them whatever, for the engines are easily handled, the motion is convenient to reach, and is put together in shape that secures great durability. Yet these engines are found to be less economical than those with the link motion, for the steam is not used to such good advantage. The valve lead is constant in all the notches, but the engines will not work satisfactorily without having about $\frac{3}{8}$ inch lead.

This road uses the Eames vacuum brake on all its rolling stock, and the engines have two ejectors connected to provide against any failure of vacuum. The old concertina form of vacuum bag is used to operate the diaphragm that controls the brake action.

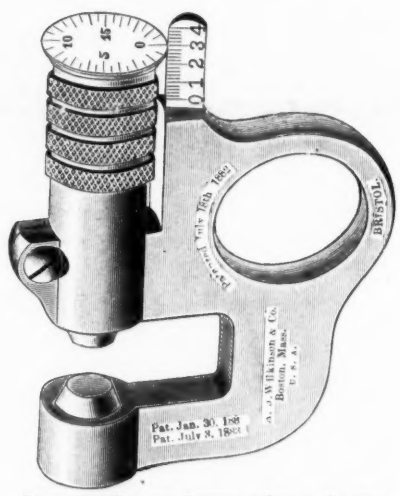
All the locomotives belonging to the Long Island Railroad Company have the boiler covered with a plaster made of asbestos, and Mr. C. A. Thompson, master mechanic, considers he effects a material saving of heat by this arrangement. Apart from its advantage in preventing the reduction of heat, the asbestos plaster gives much less trouble than the wooden lagging. It cannot take fire, which alone is a great recommendation, and, when any part outside of the boiler begins to leak, the steam or water goes direct through the lagging, thereby indicating the spot needing attention. A section of the lagging is then cut out, and, when the repairs are effected, it is replaced, and no damage has been done to the rest of the boiler covering.

Mr. Thompson has recently invented a guide oil-cup which enables the engineer to supply exactly the quantity of oil needed to keep the guides in good working order without waste, and to stop the feed easily when a trip is done. The cup has a tapered pin passing from the top down into the oil passage, and simply regulated from the top, so that it can be closed tight or opened so that the thickest oil will feed freely. A notched plate, which holds a catch attached to the feeding pin, permits the gradation of the feed to the required quantity.

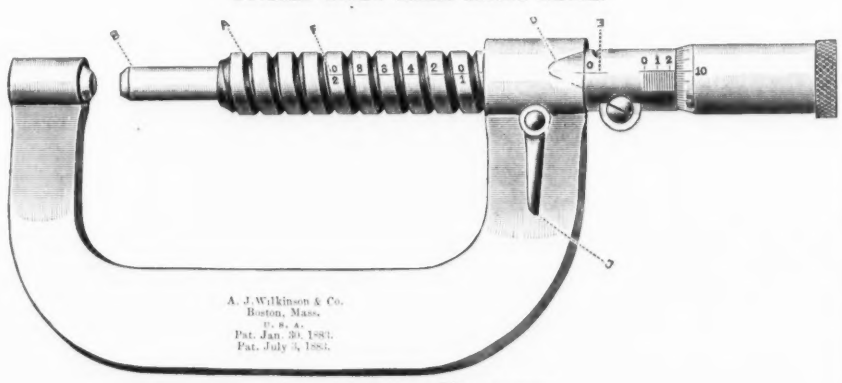
Mr. Thompson is working on the development of a spark-arresting device, where sparks leaving the fire are caught in a chamber similar to the combustion chamber of the Stevens locomotive boiler, and burned there.



MICROMETER INDICATING CALIPER.



COVERED SCREW SHEET METAL GAUGE.



SHIFTING SCREW MICROMETER.

A Manufacturing Stock Well Watered.

It is an unquestionable fact that some railroad managers have an itching for watering stock. Occasionally the officials of a manufacturing company have the same inclination, though we don't hear as much about it in the daily papers. A company called the Boneless Fish Company, publishes its annual report in one of the New York dailies. It reads thus:

"The capital stock is two hundred thousand dollars, of which five dollars has been paid in cash. The balance of its capital stock has been issued in payment of the patents. The liabilities of the Company are about three thousand dollars."

Unless the patent is of surpassing value, the stock watering process has been carried out by the fish company to a degree that ought to make Gould and Vanderbilt excited with envy.

There should be water enough for the boneless fish to swim around considerably.

Edward Bates Dorsey, consulting engineer of the American Exhibition to be held in London, England, in 1886, writes us:

"From the present outlook, this exhibition will be a great success, and must have a very beneficial result for the American manufacturer. In 1886 there will be held here an exhibition of the products of the English colonies, which must necessarily bring a great many colonial visitors here, who will doubtless see how much better some of our machines and manufactures are for their purposes than what they can buy elsewhere.

"The usefulness of this exhibition would be increased very much if the American Government would recognize it by having Congress pass the bill now before it, appropriating money for paying the freight here and back of the Government exhibit now at New Orleans."

Dangers of a Brakeman's Life.

The carnage of accidents which is continually changing the personnel of brakemen is little noticed by the public, because it is spread over an immense area, and a brakeman's death is seldom noticed except in an obscure column of a country newspaper. The American public is peculiarly callous towards loss of life, but if the people were aware of how many homes are made desolate by the death of brakemen under car wheels, there would certainly be irresistible pressure brought upon railroad companies to adopt mechanical appliances that would prevent brakemen from having to run over the roofs of ice-covered cars. The dangers of a brakeman's calling were well illustrated by an incident reported from Easton, Pa., last week. A. Kocher entered the service of

the Lehigh Valley road on Tuesday evening, taking the place of a man who had been killed on Sunday by falling off a slippery car under the wheels. On Wednesday morning, while passing over the roof of an ice-covered car, Kocher slipped and fell to the ground, sustaining injuries that caused his death. He leaves a wife and child.

The following notes on the agricultural machinery and tool exhibits at the New Orleans World's Fair we clip from the *Picayune*, of that city:

Thos. Meikle & Co., of Louisville, put in operation a moving exhibit that attracts much attention. This consists of a miniature rural scene revolving around a center, and exhibiting a series of farm implements in consecutive order as they are commonly used on the farm. An annular plot of loose earth is first furrowed by a number of breaking plows throwing the soil to the right. These are followed by riding plows reversing the furrows. Tongued cultivators come next, followed by seed planters and coverers. The harrows come next, then the field scraper, and then the roller.

The Whitman Agricultural Company, of St. Louis, exhibit hay presses, corn shellers, feed grinders and cutters, horse powers and cider mills.

The David Bradley Manufacturing Company, of Chicago, display sulky and walking plows, cultivators, corn and cotton planters, hay rakes, stalk cutters, and farm wagons.

The Aultman & Miller Company, of Akron and Canton, Ohio, exhibit traction engines, grain and rice threshers, Buckeye mowers, reapers, and binders.

The E. M. Birdsall Company, Auburn, N. Y., have portable and traction farm engines, vibrators, apron separators, and horse powers.

The Newark Machine Company, Newark, Ohio, exhibit horse and hand dumping hay rakes, drills, and feed cutters.

A. B. Farquhar, York, Pa., has separators, engines, reapers, mowers, plows, cutters, cultivators, hay rakes, and cider presses.

The Hercules Lever Jack Company, Irvington, N. J., exhibit presses of various kinds.

The Pitts Agricultural Works, Buffalo, N. Y., have engines, threshers, and traction engines.

Deere, Mansur & Co., St. Louis, Mo., make a display of plows, cultivators, corn and cotton planters, mowers, buggies, and wagons.

The Thomas Harrow Company, Geneva, New York, exhibit the Thomas Harrow and pulverizer.

Nichols, Shepard & Co., Battle Creek, Mich., make a display of their Vibrator threshing machinery.

W. E. Canedy, Rochester, Minn., exhibits a complete potato planter.

Emerson, Talcott & Co., Rockford, Ill., have mowers and cultivators.

G. W. Brown & Co., Galesburg, Ill., exhibit cotton and corn-stalk cutters.

A. W. Gray's Sons, Middleton Springs, Vt., have horse powers and threshers.

Wm. L. Boyer & Bro., Philadelphia, exhibit grain and rice threshers.

The Plano Manufacturing Company, Plano, Ill., exhibit their Plano twine-binder and harvester.

B. F. Avery & Sons, Louisville, Ky., make a display of their steel plows, rotary hoes, sulky plows, potato diggers, harrows, expanding cultivators, cotton-seed planter, corn and cotton-stalk cutters, and corn planters.

E W. Ross & Co., Fulton, N. Y., exhibit the Ross ensilage and fodder cutters.

The Brown Manufacturing Company, Zanesville, Ohio, exhibit wagons and cultivators.

Robert Butterworth, Trenton, N. J., has on exhibition fruit evaporators and cider presses in active operation.

The Cambria Iron Works, Johnstown, Pa., have plowshares, rake teeth, cutter bars, finger bars and harrow teeth.

A. Schwarzwaelder, Belleville, Ill., exhibits wheat scourers and shellers.

John Boyd, of Chicago, exhibits a Cooley creamer, for dairy use.

The Landsdale Agricultural Works, Landsdale, Pa., have threshers and horse powers.

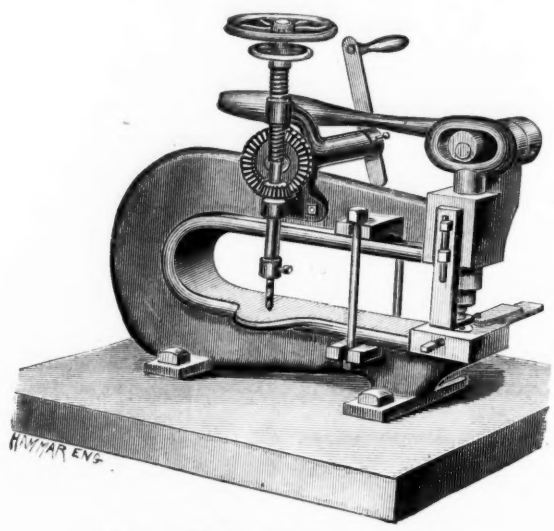
Hiram Holt & Co., East Wilton, Me., exhibit their lightning hay knife.

D. C. & H. C. Reed & Co., Kalamazoo, Mich., exhibit spring-tooth harrows, cultivators, and seeders.

S. L. Allen & Co., Philadelphia, Pa., exhibit the Planet, Jr., and Firefly farm and garden implements—seed drills, wheel hoes and plows, cultivators and coverers.

The "Little Wonder" Punch and Drill Combined.

This punch is more particularly designed for the use of tinsmiths, coppersmiths and sheet-iron workers. It will punch a $\frac{1}{4}$ inch hole in the center of a $1\frac{1}{4}$ inch angle iron, $\frac{3}{16}$ inch thick. It has a gauge for regulating the distance of holes. As at present constructed it will punch a $\frac{5}{16}$ inch hole in anything from 1 C. tin to No. 10 sheet iron, and larger holes, up to $\frac{1}{2}$ inch diameter, can be punched in lighter iron. It is operated by a compound eccentric lever motion, lever 24 inches long, which enables it to be worked very easily and rapidly. Light heater, tank or boiler heads can be punched after they are flanged over to one inch, avoiding breaking out of holes as where the flanging is done after punching. Coffee pots and cullender bottoms can be punched after they are raised, as they set up above the general surface.



"LITTLE WONDER" PUNCH AND DRILL.

It occupies a space of 6"x24", and will punch the center of a 30" sheet, the brace bolts being used only for iron heavier than No. 14. It is furnished either with or without drilling attachment.

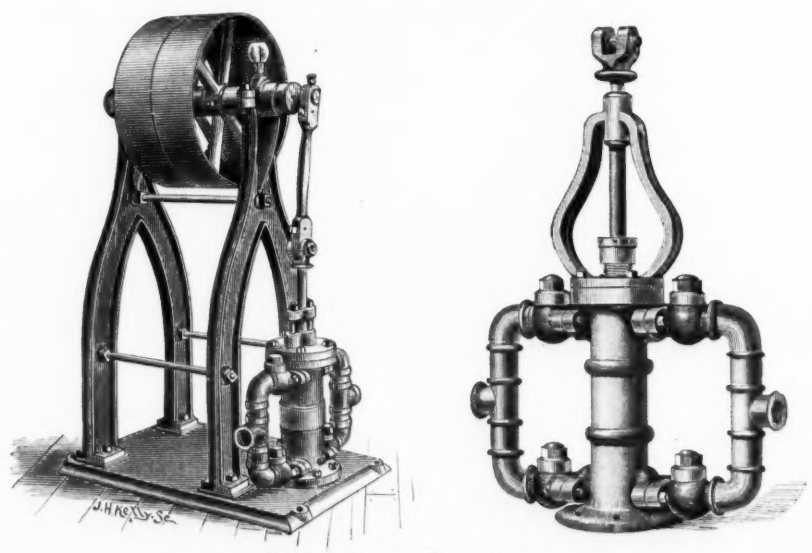
Manufactured by the Little Wonder Punch Co., 57 North Second Street, Philadelphia, Pa.

The gross receipts of the railways of the United States during 1882 was $770,356,716. During the same year the gross earnings of the 195,869 licensed saloons was $979,345,000. The whisky seller, therefore, took in 209 *million dollars* more than did the railways.—*Railway Register.*

Double-Acting Power Pump.

The arrangement of the valves in this pump, which are clearly shown in the engraving, is one adopted by the manufacturers about twelve years ago, and one which has been found to give good satisfaction. The construction shown is that of their recent pump, mounted and unmounted.

The piston rod is of steel or composition metal, as preferred. The water piston is of composition metal, packed with rings or fibrous packing. The pump is now made with a cross-head working between guides, which does not show in the cut. By this means the piston rod is kept central.



DOUBLE-ACTING POWER PUMP.

The valves and valve shells are made of composition metal, and are especially heavy and strong.

Altogether, the pump is well designed for strength and durability, is simply constructed, and easily set up for working. It is manufactured by the Valley Machine Company, Easthampton, Mass.

We have received from Mr. W. P. Norton, a mechanic of Thomaston, Conn., an excellent blue print of a locomotive which he designed, working out the details by the midnight oil after ten hours of labor in other mechanical pursuits. The drawing shows very creditable work, but there is nothing sufficiently valuable or novel about the locomotive to induce us to have the drawing engraved. We hardly think Mr. Norton will get any railroad company to build the locomotive he has designed, but it will not follow that the labor he has devoted to the matter will be lost. The knowledge gained by earnest study, and the skill begotten of industrious application will, in time, bring their own reward.

It has been demonstrated that there are some things which will not work as well backwards as forwards. The machinery in feed mills is a case in point. One such mill in Royal Oak refused to do good work; and upon investigation by an expert it was found that they were grinding backwards.—*Grand Rapids Morning Telegram.*

Rise and Progress of the Largest Iron Works South of Richmond.

BY ROBERT E. MASTERS.

In your issue of April 12, 1884, I stated that at some future date I would give a brief history of the Columbus (Ga.) Iron Works, from its foundation up to the present day.

In 1852, Mr. W. R. Brown, a practical green sand and loam moulder, started a small foundry, 40′×60′, on the site of the present foundry, doing the larger portion of the work himself until 1856, when Judge J. W. Thomas and others were admitted to the firm, and, procuring a charter under the name of the "Columbus Iron Works Company," they erected larger buildings, and commenced operations on a more extensive scale. From this small beginning has grown, to quote from the Exposition edition of the New Orleans *Times-Democrat*, "the largest iron works south of Richmond, Va.," etc. Mr. Brown was elected president of the new firm. In the latter part of 1860 he visited Whitney's Car Wheel Works in Philadelphia, and, through the kindness of a member of that firm, was instructed in the manufacture of car wheels. Returning to Columbus, preparations were made to manufacture, the firm realizing, if war broke out, there would be a good market here in the South for that special production. Patterns and flasks were made, annealing pits built, and a few wheels cast to experiment on the chill the iron would take, when the Confederate Government put a stop to the proceedings by taking possession of the works.

Additions were made to the works, and under the name of the "Naval Iron Works," with W. R. Brown, S. J. Whiteside and G. J. Golden as superintendents, it was made one of the most important institutions for the manufacture of brass cannon and missiles of war in the Confederate States.

In 1865 the Federal forces, under the command of General Wilson, raided this section of the country, and the "Naval Iron Works" met the fate of like institutions in the South. The machines were all broken, and the buildings burned to the ground. This was expected as one of the results of war. The only relics remaining here now, as a reminder of what existed in those days, are the brass furnace and a 60″×36″ cupola, both in use in the present foundry.

Immediately after the Union forces left here in April, 1865, the indefatigable energy that has always characterized Mr. Brown was here brought to play, and in June of the same year the first heat was taken off for domestic purposes in the new foundry of the Columbus Iron Works Company. Substantial buildings, covering a block and a half, were erected, and stand to-day a monument to the perseverance and pluck of the company's founder and present president.

All the ordnance, shot, etc., left here were bought by the Iron Works Company from the United States Government for old iron. Among this old scrap were several tons of loaded bomb-shells, which were stacked in the yard back of the foundry. One day at noon-time two boys, about thirteen years of age, got one of the shells out, and, in trying to pick the powder out of it, the bomb exploded, killing both the boys. Near the foundry was an abandoned well. After this accident the bombs were all thrown into the well, and covered with cinders from the foundry up to the surface, and there they remain to-day.

The following dimensions will give an idea of the amount of work this establishment is capable of turning out, and so diversified are the orders that have been filled and required to-day for this Southern trade that they are prepared to make almost any kind of jobbing work, from a sash weight to a steamboat:

The machine shop, 45′×275′, is complete in all its appointments, being supplied with pulley lathes up to 14′ diameter; shafting lathes up to 5′6″ swing and 28′ long; planers of various sizes to 6′×6′ and 30′ feet long; a variety of improved drill presses; bolt, pipe and nipple threading machines. In the past season they have added a 54″ radial drill

press from the Philadelphia Machine Tool Works, a No. 2 Brainard milling machine, and one of Garvin's grinding machines. This department is run by a 50 horse-power engine.

The blacksmith shop is 45′×80′; has five forges, steam power and belt hammers, bolt heading and nut-shaping machines.

The boiler shop, 45′×50′, has a special engine of 18 horse-power to run its drill presses, punches, shears, etc. They are about to add a large combined shearing and punching machine to this department.

The foundry building is 75′×130′, and is covered with iron roofing; has two cupolas with a melting capacity of 50,000 pounds daily; brass furnaces, one 20-ton crane, a core oven 12′×12′ and 42′ long, and core room 14′×35′. The cupola fans and mills to clean the castings are run by a 25 horse-power engine. This department, in which the writer takes a special interest, will be given in detail in some future issue of the AMERICAN MACHINIST, together with the construction of the core ovens.

The pattern shop, 25′×40′, is replete with all the latest improved machinery used in that branch of the business. The storage rooms for patterns are 30′×300′, and two stories high.

The plow department is engaged in the manufacture of steel plows and agricultural implements, and is well furnished with trip hammers, presses, shearing, bending and polishing machines. The building is two stories high, 45′×140′.

The wood-working department and planing mills are 90′×250′. The machinery is of the most substantial kind for the work, and run by a 50 horse-power engine.

The steam for the four engines mentioned is furnished by a battery of ten boilers, and departments are well supplied with water from the city water works. In the center of the works is a small building containing a fire plug and hose carriage with enough hose of the standard fire department size to reach to any part of the works, and it is always attached to the plug ready for instant use. The company, when working to their full capacity give employment to 300 men.

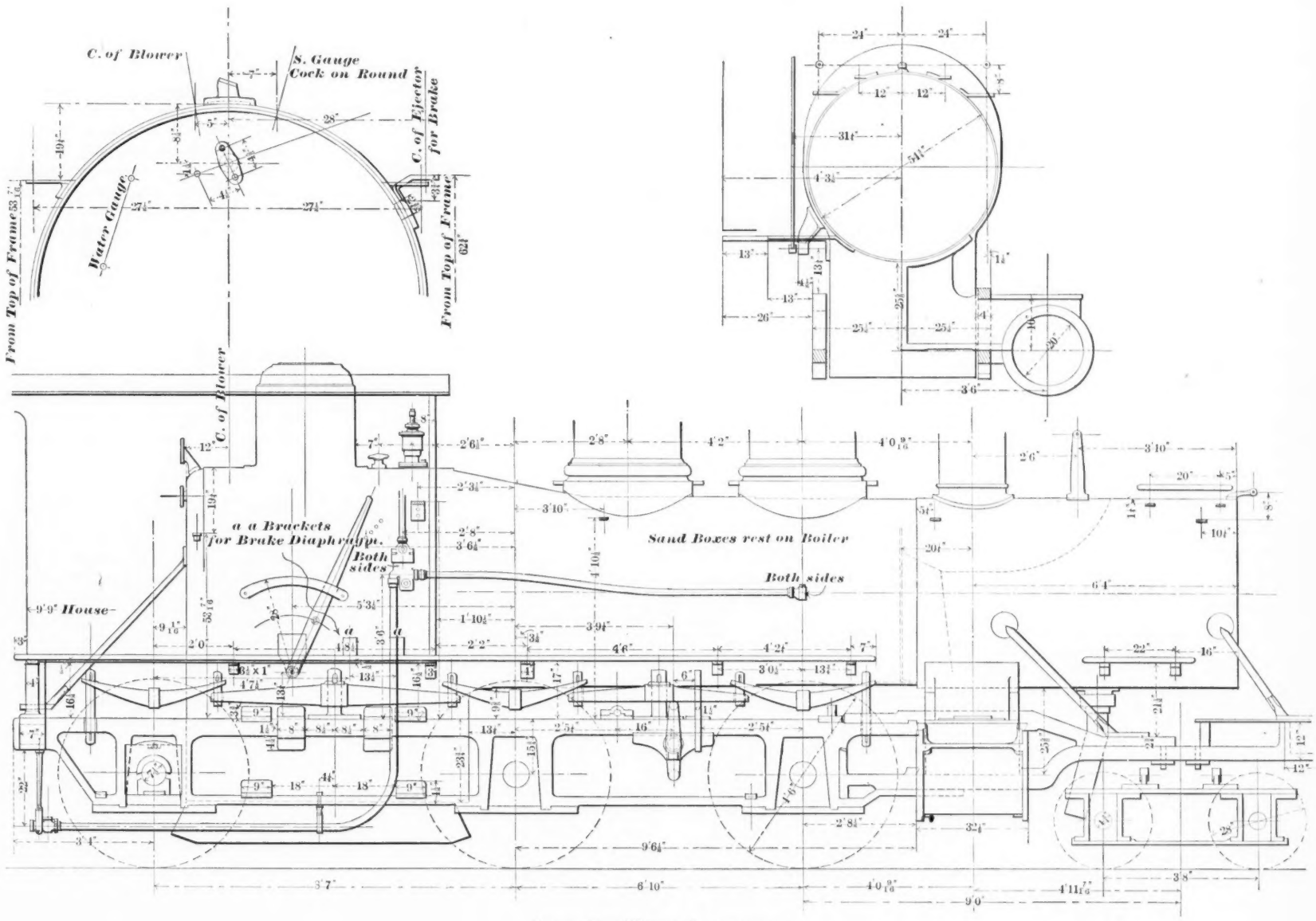
Permit me (as a Northern man) to say that the poor treatment one hears so much of in the North, that Northern men receive at the hands of the people in the South, does not exist in fact. No man whose conduct proves him to be a gentleman as well as a mechanic could ask kinder or better treatment than he will meet with here in the South.

To use the expression of a Northern gentleman who took an active part in the raid through Georgia: "Those who took an active part in the war are not the ones who are flaunting the bloody shirt to-day." No one suffered more from the ravages of war than this firm, and the fact that they employ men from the North at the head of the different departments of their works proves the truth of my remarks.

One of the older members of the firm related to your correspondent a short time ago, how amused he was at the efforts of some of General Wilson's soldiers to break up a twenty ton fly-wheel here in the works. After pounding on it for a long time they gave it up, and the wheel did service in a rolling mill until two years ago.

Cooke Ten-Wheel Locomotive.

This locomotive, which we illustrate in part section, is one of seven locomotives recently built by the Cooke Locomotive and Machine Company, Paterson, N. J., for the Elmira, Cortlandt and Northern Railway. The most prominent peculiarity about the engine is that a four-wheel engine truck is placed entirely in front of the cylinders. This is, however, not the only point in which the design departs from the ordinary accepted American practice. The boiler, which is of the wagon-top type, has the cylinder part 54, tapering to 55¾ inches diameter, and is intended to carry a working pressure of 175 pounds to the square inch. To sustain this extremely high tension, the boiler shell is made of steel 7/16 inch thick. The longitudinal seams have welts on the inside, with rivets alternately on each of main seam to strengthen caulking edge. There are 200 flues, 2 inches diameter and 10 feet 8 inches long, fastened with copper ferrules at both ends, and brazed to flue on the fire-box end. The fire-box, which is made of the best Otis steel, is 73 inches deep, 72 inches long, 33½ inches wide, and has a water space of 3½ inches between the sheets. This boiler supplies steam to cylinders, 20 x 24 inches, which transmit the power to three pairs of coupled driving wheels, with 54 inches centers. The valves are the Richardson balanced; pistons, cast-iron, corrugated shape, with three cast-iron packing rings ½ inch square section. The boiler is covered with asbestos lagging; two sand-boxes are placed on top of boiler; an extended smoke-box and open stack are used. The engine is fitted with the Eames brake equipment, and the shoes are applied to both sides of the driving wheels. No pumps are used, the boiler feeding being done by two Hancock inspirators, one on each side.



COOKE TEN-WHEEL LOCOMOTIVE.

Promoting the Training of Workmen.

There is a practice in Scotland, that might be imitated to advantage in this country, of industrial establishments holding an annual soiree or social gathering, where employers and employes, with their wives, families and friends, spend an evening together in social intercourse. The employes belonging to the works of Messrs. T. Shanks & Co., Paisley, Scotland, lately held their annual soiree, at which Captain Shanks, head of the firm, presided. The chairman warmly welcomed the guests, and testified to the beneficial influence of such meetings. He dwelt with some pride on the fine arrangements of the works for facilitating work, and for advancing the comfort of the employes. Speaking of the desire of the firm to promote the interests of employes, he said:

"The time has come, in the Union Iron Works at least, when a young man has an opportunity of advancing himself, if he is so disposed, such as he has never had before. In a work like ours there is a great scope for promotion; and I want you clearly to understand that the firm of Thomas Shanks & Co. intend in the future to give every encouragement to young men desiring to advance in their profession. When an under-foreman or a foreman is wanted for a department, we don't want to bring in outside aid if it can be found within ourselves; and this, I think, we can work up to. But to reach this state of matters you will find that, in any aspirant for promotion, his heart must be in his work. No one will ever succeed who is waiting for stopping-time coming, to get rid of the irksome duties of work, that he may indulge in relaxation. I would be the last to say that relaxation is unnecessary; but in some natures this is the sum and substance of their being. These young men, I say again, will never rise to prominent positions in their trade. An apprentice now-a-days thinks that, if he has got a smattering of business, no more will be required of him; but such a one will find that this will not do. If he wants to rise in his profession, he must not only be able to do, but he must know also the why and the wherefore for everything. He must attend classes for mechanical drawing and applied mechanics; and in the case of a young man attending a machine, he must not only know how to turn work out of it rapidly and accurately, but so master all the detail that he ought to know for himself whether more work could not be advantageously taken out of the machine, and by doing so not to think that he is putting money into his employer's pocket, but with the idea that at some future time it will put money into his own, by proving himself worthy of a higher position than that of a common workman; and depend upon it, as surely as you excel in fitness, just as surely will that position be yours. Every one cannot rise to be a Watt, a Napier or a Whitworth, but every one can try to do his best, and those who really try generally succeed. There is another matter that I dare say some

of you think of little importance, and that is the care of a machine. Some workmen are so untidy that, give them charge of a new machine, before many days, or weeks at most, are over, a stranger would not know whether the machine was new or old. He first allows one part to get out of order, then another, and so on, till it gets from bad to worse. For instance, a nut requires screwing up. Rather than look for the proper key, he uses one too large, or he applies his chisel and hammer, if more convenient, and makes that special nut so unsightly that it is the beginning of the end. So impressed am I with the motto, "A place for everything and everything in its place," that, to endeavor to stimulate the workmen here to keep their machines in a proper working condition, we propose giving a series of money prizes to the men who keep their machines in the best order. Those prizes will be given every quarter, and the allocation will be in the hands of the manager and foremen. Within the next few weeks you will know the sums proposed to be given for the best-kept machines. What I mean by this is, that each machine is to be kept in perfect order from the driving belt to the cutting tool, and this can all be done without entailing any extra work on the attendant. Of course, I know that an old machine can never look so well as a new one, if they are both properly kept; but this I also know, that the old one often looks the best, because the man attending it has some pride in keeping it right. I think I have said enough on this head, and will now look at the state of trade, and the general depression this country is passing through. Although trade generally is very bad, and shipbuilding particularly so, still during the year just closing we, as a firm, have every reason to be satisfied with the amount of work we have passed through our hands; and although at the beginning of the year we had to fight against the difficulty of a removal, yet we have got over it as easily as I expected, and I can honestly say I don't want ever to have another flitting. The lookout for the future does not promise so well. Although we have a considerable quantity of work in hand, yet, with our greater facilities for getting through it, we can now do in one month what before would have taken two. And as this depression cannot last forever, the turn must come soon. I am a believer in thinking that the world is not yet coming to an end; and although we have been commercially far on the under side of the line, so we soon will be on the other side. Machine tool-making, so far as special labor-saving machinery is concerned, is yet in its infancy, and I anticipate a future for it. Up till now the advantages to be derived from machinery were not understood, and people were content to go on as they had been doing, but fortunately for us, those Middle Age days are drawing to a close, and first-class firms now purchase machines, costing sometimes thousands of pounds, that some years ago they would never have thought of. In all this competition, this is a race for supremacy, and it will not do for us to stand still. It is no easy matter now to be a tool-maker in the van of progress. Purchasers are getting educated up to a pitch never dreamed of a few years ago, and they will now buy nothing having an antiquated look about it. The time is rapidly approaching when it will not pay to retain machinery that ten years ago was considered nearly perfect. And when one goes round and sees the amount of such machinery requiring to be replaced, there is great room to feel satisfied that there is a prospect before the trade such as has never been before. And to be in a position to take advantage of this is the aim and determination of our firm. This cannot be done without your co-operation, and the time has come for work. No one, I don't care who he is, be he employer or workman, will ever succeed who does not face the current with all the energy of his being; and, depend upon it, those only will succeed who strive to attain the goal."

Drawings in pencil can be preserved by varnishing with an alcoholic solution of white gum lac, applied to the back of drawing.

LETTERS FROM PRACTICAL MEN.

Wanted—A Flue Cleaner for Upright Boilers.

Editor American Machinist:

I have often remarked upon the disadvantages of poverty (I think you may have heard me). These disadvantages take on various forms. Of course you of the AMERICAN MACHINIST don't know much about it, but possibly some of your readers may know, from hearsay at least. I will not attempt to go into the many ways in which this sad condition of things that I would prefer to call "unwealthiness" may take hold of, and harrow up a man's soul, but will only mention at this time a single one on a long list which I have in mind, and that one is the loss attendant upon the making and using of steam in comparatively small quantities. There are no small engines that are economical in comparison with large ones, and as for boilers, those of the upright persuasion seem to be most generally tolerated, and yet no one is prepared to swear that they give very large returns for the fuel that they always seem to be hankering for. Now, how are you going to clean the flues of an upright boiler? If some reader of this paper can come forth with an answer, he will earn the thanks of many, and get 'em, too. (And any man who gets what he earns is in luck these times.) There must be more or less ingenuity going to waste, or, what is worse, being used for needless purposes, which might be aimed at the development of a flue cleaner for upright boilers. It must be a scraper (steam won't do it); it must work from the fire-box without taking out the grates, and it must not cost too much money. If somebody don't make this thing I shall be sorry, for I want one.

STERLING ELLIOTT.

Driving Foundry Blower Ninety Feet from Power.

Editor American Machinist:

C. T., of Guttenberg, Iowa, asks, in your issue of January 24, how to conduct the blast from his blower to a cupola located 50 feet from his power, and you advise him to use a pipe of that length, and presumably locate his blower where the power is. To all of which I cannot help but say, "Don't." I have had experience with long blast pipes, and am sure that the friction of the air in them is greatly in excess of the friction or loss of power, when communicated, as I planned to do it, in the works of this company, after the fire which destroyed them two years ago.

Our cupola is located about ninety feet from the power, and the blower is a No. 5 Mackenzie. I have been entirely successful in transmitting power to it by means of a common Manila rope, two inches in diameter, running upon two inexpensive wood-rim pulleys, five feet in diameter, with grooves about two inches deep. Nothing whatever was done to the rope, except to splice it. It runs out of doors, exposed to all sorts of weather; ice and snow do not interfere with it, and it never slips or troubles us in the least. Besides the blower, it drives a tumbling barrel two feet diameter and six feet in length, often loaded with a ton and a half of castings.

It has now been running over two years, and the rope will last another year or more, and when worn out $10 will replace it. I believe it is far better than a wire rope, costs less at starting and less for maintenance.

A long pipe, if of metal, and underground, will soon rust out. If above-ground, contraction and expansion will destroy its joints or connections; while, if of wood, it is sure to leak from the start. Besides these objections, it is evident that the only proper place for the tumbling barrel is close to the foundry. Let C. T. try my plan with confidence, and he will find that it will not fail him.

Very truly yours,

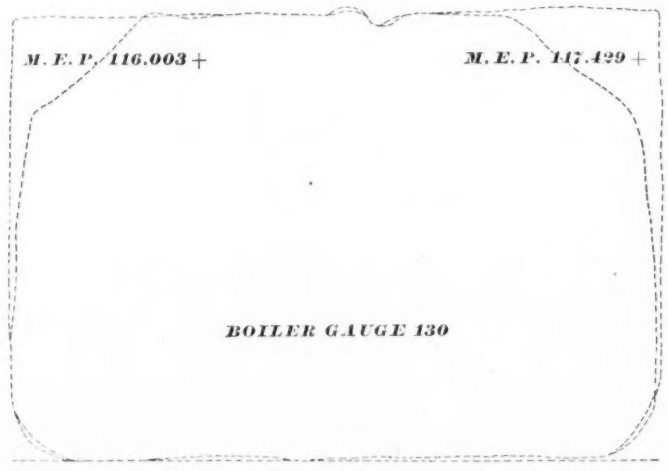
JAY S. CORBIN,
Supt. St. Lawrence Manufacturing Co.

High Efficiency of Locomotives.

Editor American Machinist:

In your issue of the 10th inst., under the head of "Miscalculating Train Resistances," you say "The highest mean effective pressures we have ever seen made use of with a link-motion locomotive carrying 130 lbs. of steam, was 113 lbs., as shown by the indicator." In discussing the diagrams taken by the Stevens locomotive, you further say: "The largest of these diagrams, reproduced page 5, taken from the Stevens locomotive, shows a mean effective pressure of 114 87 lbs., which is over 88 per cent. of the boiler pressure, but that motion admits of work not produced by the link motion."

The enclosed diagrams, which I took last July, from a locomotive fitted with link motion, cylinders 18″×24″, built by the Pittsburgh Locomotive Works for the Vandalia road, and in use at the time for hauling freight trains between Terre Haute and Indianapolis, show mean effective pressures of 116.003 lbs., and 117.429 lbs. respectively—90 per cent. of boiler pressure. You will see from memoranda on diagram that the train speed was slow, about four miles per hour.



It is not surprising that such enormous pressures get into the cylinder at these slow speeds, for, under such conditions, the steam pipes and ports are very large, but it is marvelous that the mechanism of the machine stands such strains repeatedly, day after day. When one considers the light guide bars, piston rod, and long slender connecting rod in connection with intermittent tensile and compression strains of over 29,000 lbs., as in the case of the Pittsburgh locomotive, he cannot help wondering how it is done, yet experience proves them to be amply strong. Such cylinder pressures are not possible when a fair piston speed is attained. Wire drawing through the steam pipes and ports, limits the steam line, and the contracted exhaust nozzle seriously raises the exhaust line, but even under these conditions a mean effective pressure of 70 lbs. or 80 lbs. is very common for long pulls.

One cannot imagine better performance than that shown by this locomotive in her run over the division—a distance of about 80 miles—part of the way at a speed of 40 miles per hour.

A study of the locomotive of to-day, from the foot-board or buffer beam, is very instructive, and cannot fail to convince the investigator that the machine is wonderfully adapted to its work.

HARRIS TABOR.

The Fahrenheit Thermometer.

Editor American Machinist:

Why we do not "get rid of the Fahrenheit thermometer," is that we are not a showy, fanciful people, but a truth-loving, practical people, and the thermometer we have is the best in use. To begin with wants or negative defects, it has none which others do not have. All the thermometers in use record an arbitrary amount of variation of heat, and leave an unrecorded arbitrary amount both above and below the so-called zero or 0°. There is no approach to truth, no gain of convenience or ornament, by fixing 0° or zero at the melting point of ice, and there is no gain in convenience, use or ornament, in calling some point, say a visionary boiling point, 100°, for the 100 is never used as a unit, and therefore has no actual use or existence of itself.

There is nothing in the proposed change, except to let the world know we follow the French, which each of us may do for himself more honestly and wisely by the cut of his beard, or some other way which pleases himself and does not injure his neighbor. To have 180° where others have 100°, where the 100 is never used, is no loss either in reading the instrument or in expressing the quantity, in fact is no loss of any kind, for 180° actually expresses the truth more accurately than the 100°, besides it takes away some of the temptation to easily divide the degrees by 10, as is sometimes done.

There is nothing sought to be gained by fixing the zero point at that of melting ice, and nothing possible could be gained except to let the world know that we are ready to do the very stupidest thing possible, in order to get into the fashion. For the most common use of the thermometer is to record the weather, and for no end in the world should we make it an instrument of interminable confusion, by placing the zero point where we would have to say above or below for six months in the year.

Now, when it gets below, we say *below* with an emphasis which is not easily misunderstood.

The anti-English humbug of getting rid of our thermometer would not be tolerated, however hard a few of us might try, as the truth, and 95 per cent. in numbers, and 99 per cent. of intelligence, and that strong point, possession, are against a change. But to propose this, and call it science, is a cheat, a delusion, and a sham, alike disgraceful to those who propose, and those who believe it.

TROY, N. Y. WILLIAM COUTIE.

Advice to Young Men.

Editor American Machinist:

When business is depressed the manufacturer thinks he must get along with a young man or boy in the place of a competent man, and the following is the result:

S. & Co. discharge their engineer and in his place put a young man who has served a short time as wiper in another place. He can oil and wipe an engine, knows how to pound with a hammer and twist the corner off nuts with a wrench, and that is enough until times are better. No sooner is he in the engine room than he considers himself quite an engineer. Because the engine does not happen to break down the first week, he gets an idea that he is an old hand, and a desire comes over him to see the inside of the engine. So at the first opportunity he pulls it to pieces, placing part of it on the floor, some on the cylinder, and some on the bench, strewing it generally about the engine-room; all small nuts, keys or screws he happens to have he puts in one of his many pockets.

Now, young man, the trouble commences. Objects that were familiar to you look strangely different now, as they lay strewn about the room. But together it must go, so you begin with the steam-chest. Where did you put the bolts? Oh! here they are in this pile by themselves, so they would not get mixed with any of the others. That is nice, no doubt, but when you go to put them in, one goes in with the use of the fingers

only, while another requires a long wrench. What is the matter with them? They came out easily. The matter is simply that little pile. Now, that you have the bolts all started you begin at one point and screw them up tight as you go along so as to know where to leave off. Queer some older head didn't think of the same thing.

Where are the valve rods? In a pile by themselves also. But which is which? I don't know, but will try them and see. This one goes on hard, give me my hammer. Now you exhibit the one thing that you can do and do as well as any one, and that is, pound with a hammer (don't use a block of wood, for in time you would be certain to destroy the block).

One other thing you know ought to be done, and that is each individual piece should be carefully wiped, and the waste deposited—well on the floor is the handiest place. You pick it up and wipe a piece with it, lay it down, roll it over and step on it until it finally becomes well mixed with grease and grit, but it is waste and that is enough.

Let's see how far did I run this nut back on the eccentric rod? Well, two or three times, more or less, it don't make much odds.

You have it together at last. It came apart easy enough, but it went together very hard.

Now is the great moment in your life. You have had an engine apart and put it together all yourself, and are about to start it. Finally you get on steam enough to get it up to speed. What is the result? It pounds, squeaks, groans and heats. What is the matter? Simply your incompetency.

The bearings are all full of grit from the dirty waste; some parts you oiled and some you didn't. You mixed up the valve-rods, keys and screws. You did not get the nut on the eccentric-rod in the right position. In fact, you forgot a thousand and one little attentions necessary to have an engine run properly, which a man who has learned his trade will not forget.

Now, young man, first of all, let well enough alone. Never disturb an engine without occasion demands it, and if so, do it systematically. Have the floor swept clean, and spread some old sacking which is clean. When you take a part off clean it with clean waste, being careful to keep your waste from all grit. Run your hand over the part to see if the waste has left anything on it, as the hand will readily detect the smallest particle of grit. After you have cleaned a part lay it back out of the way just as it came off, and all the small stuff with it, just as it belongs.

When you take off the head or steam chest take the bolts and lay them in a circle or hollow square, with the small ends in so that you can put them back just as they came out. You will be surprised to see how much faster the work will progress.

When you come to a thing that sticks, find out what causes it and remedy it. The builders of steam engines do not always do their work well. But whatever you do, don't use a hammer, use wood or lead tools to pound with. If you use blocks cut them about 5 inches long and 8 inches in diameter, of hard wood, keeping them on hand all the time, replacing them as fast as one gives way, never waiting until needed.

When you put a wrench on a nut, see that it fits it before you begin to pull, or you will soon spoil both wrench and nut. If a nut goes too hard, take it off and clean the thread. An easy way to clean a gummed thread is given in the AMERICAN MACHINIST of Sept. 23, 1883, page 7.

If your oil can gets stopped up look out for it, as it does no good to stick the snout of a can into an oil hole unless you leave a drop of oil there.

Empty out both your can and filler and wash them out clean, then got a piece of thin cotton cloth and strain the oil, it will not take long, and you will be sure of the cans delivering a drop of oil every time it is required. And, lastly, when your engine runs bad, sit down and try and reason out why it does so. And take a good paper to read.

PACKING.

Heating Railroad Cars with Steam.

Editor American Machinist:

I read with interest your article in issue of 24th instant on the heating of railroad cars. Why could they not be heated with steam? On the railroad from Hamburg to Berlin the cars built in compartments, after the English fashion, have in each compartment a brass quadrant, with lever handle, inscribed at the ends, "Hot," "Cold." By this arrangement a traveler can turn steam, which, I believe, is from the exhaust, through pipes running under the seats. Having traveled several times on this road in January, 1883, I can answer for the efficiency of this mode of heating. As you are, no doubt, aware, the German railroads are under Government control; a safe mode of heating is probably enforced.

H. E. KYLE.

[We do not think it is practicable to heat trains in this country with exhaust steam. The elevated railroads of New York heat their cars very successfully with live steam from the boiler of the locomotive. There is no reason why all railroads running local and suburban trains should not heat their cars with steam from the locomotives.]

Exhaust Lap.

Editor American Machinist:

As my communication on exhaust lap has called out several opinions, I think, particularly for the benefit of C. L. Redfield, who replied to me in your issue of January 24, I ought to give particulars of the valve construction to which I had reference. The steam ports are $\frac{9}{16}''$x4$\frac{7}{8}''$; exhaust port, 1$\frac{3}{16}''$x4$\frac{7}{8}''$; bridges, $\frac{7}{16}''$. The length of valve is 4"; cavity in valve, 1$\frac{7}{8}''$x4$\frac{7}{8}''$, which leaves each lip of valve 1$\frac{1}{16}''$. The travel of valve is scant 2". From this Mr. Redfield will see that the condition he assumed could not have occurred. Indicator diagrams were taken which were satisfactory to the builders, but which I believed showed too much back pressure. The back pressure line was as straight as the atmospheric line, but too far above it. I also thought there was too much compression. I had no chance to get a diagram after cutting out inside lap. This, and other cases, have convinced me that, with forced draft at least, inside lap has a good deal to do, in a bad way, with coal and water consumption.

FRANK HILL.

Moulding Potash Kettles in Green Sand.

BY GEO. O. VAIR.

Such kettles are usually made in loam, having the bottom cast up; but, having seen them successfully cast in green sand, I thought the plan adopted in making them might be of interest. The kettle, the method of moulding of which is represented, was about 36" diameter and 58" deep. As will be seen by Fig. 4, the core was used as a pattern for bottom of kettle, with a thickness swept on, to be taken off afterwards, to give the required thickness of metal.

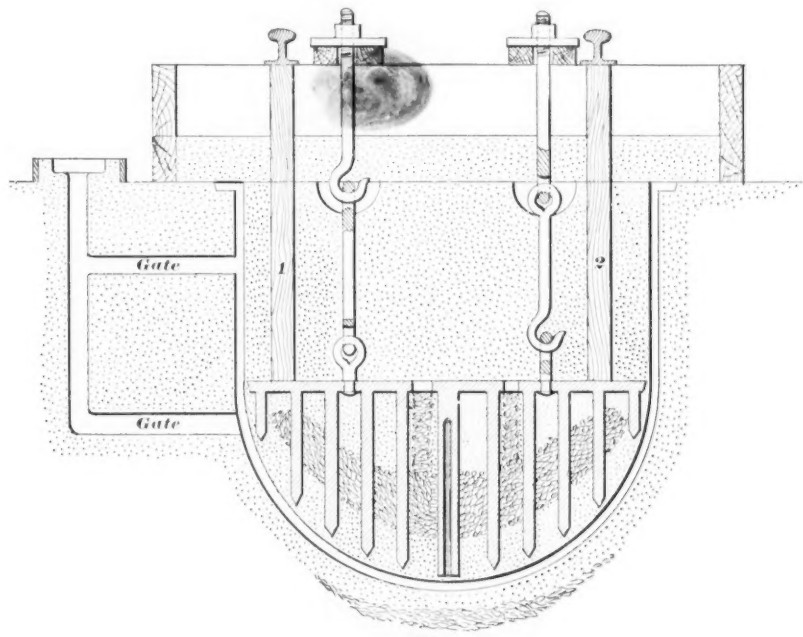


Fig. 1
Section of Mould.

Fig. 3
Flange

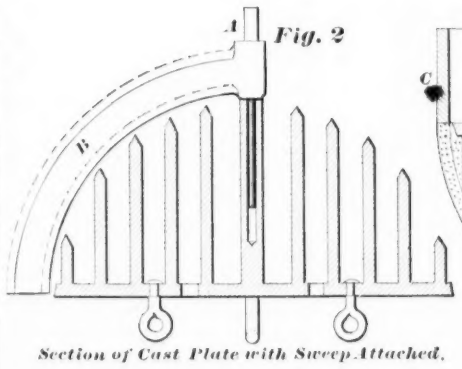


Fig. 2
Section of Cast Plate with Sweep Attached.

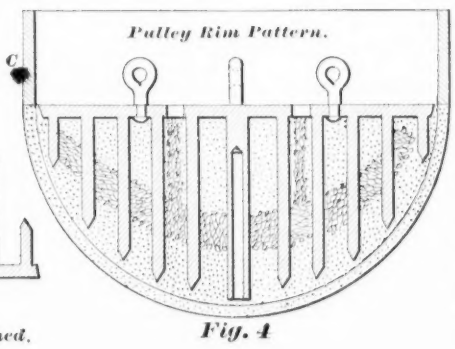


Fig. 4

Fig. 2 shows cast core-plates with sweeps attached, the second sweep being shown in dotted lines. In center pricker (which ought to be considerably larger in diameter than the rest) there was a hole drilled for pin *A*, to hold in place sweep *B* while making dry sand core. Before sweeping on the thickness, the core was blackwashed and dried. The blackwash used was charcoal, mixed with clear water, which makes a nice parting, so as the thickness can be removed without difficulty. It is necessary to use a few nails to help hold thickness, as the core has to be turned over before bedding-in.

Pulley rim *C* was 3" deep, and was drawn to the desired height. Fig. 3 shows half-circle of flange; usually a shorter segment is used for bedding-in to form flange on top of kettle. The uprights, 1 and 2, shown in Fig. 1, were 4"×4" hard-wood scantling; their use will be obvious to nearly all moulders. As will be seen, one end rests on cast-core plate, and the other end is even with the top of kettle. In ramming up cope, there were other 4"×4" pieces set top of the lower ones, the top ones being wedged under the rails shown. This is necessary to keep the dry sand core from raising and bursting the green sand on top of dry sand while the mould is being cast.

The cut shows a wooden flask. Although a wooden flask could be used, an iron flask is preferable, as it is less liable to spring.

This kettle was made on a bolting-down floor, which, I think, is a good deal better for this class of work than to use weights.

The question might be asked: How is a moulder to get at the bottom parts of a kettle of this depth to finish in case of "soft spots?" In reply, I will say, ram it so that when you get your pattern out it will be already finished, excepting what little sand may have fallen in; otherwise it is a hard matter to get a first-class casting, as there is a great amount of strain on the bottom parts of a kettle of this depth, or on any other casting of the same shape.

Civil Engineers' Meeting.

The American Society of Civil Engineers held its annual meeting in the society's rooms, New York, on January 22. The subject under consideration which received the greatest attention was the new standard time system, which would make the hours of the day count up to 24 o'clock. A report of a committee appointed to investigate this subject was submitted by Prof. Egleston. The resolutions of the International Conference recently held in Washington were pronounced substantially in accord with the principles which have been urged by the society. Since last June the committee has communicated with a large number of prominent men in all parts of the country, and found 92 per cent. decidedly of opinion that the hours should be counted in a single series from zero to 24. Replies were also received from 171 railway officials, presidents, managers, and superintendents, of whom 98 per cent. expressed their sympathy with the movement and stated that they would be prepared, when it was ascertained that the feeling was general, to abandon the old 12-hour system. The officials who will support the 24-hour system represent 59,100 miles of railway. The telegraph interests were also reported in full sympathy with the new system, and the president of the Western Union was given as authority for the statement that, besides reducing the number of errors, fully 150,000,000 letters would be saved annually in transmission if it were adopted. The committee thought the day not far distant when a change would be actually accomplished, and by the railway companies. It was recommended that railway companies should provide small supplementary dials to be pasted upon the dials of the watches of all employes, and dials of proper dimensions to be pasted on station clocks to familiarize the public with the system. It is said that several railway companies have already taken steps to do this. A committee from the society will probably be sent to the Railway Time Convention, which is soon to be held.

Mr. Oberlin Smith arraigned the Patent Office for mismanaging the business of inventors. The force in this office he pronounced too poorly paid to be efficient, and the rooms at their disposal entirely too small. Patents, he said, used to be passed on in a few weeks. Now it took from three to twelve months. Such delay was a drawback to engineering and to science. He urged that Congress be memorialized for relief, and that every effort be made for reform in the Patent Office. The matter was referred to the Board of Direction to investigate and report.

A proposal that the society library should be united with that of the Mechanical Engineers' Society led to an animated debate, but it was eventually decided to refer the consideration of the matter to a committee which was appointed.

The society visited in a body several of the largest industrial establishments in New York and Brooklyn. The officers elected for the ensuing year were: President—Frederic Graff; Vice Presidents—George S. Greene, Jr., Thomas J. Whitman; Secretary and Librarian—John Bogart; Treasurer—J. James R. Croes; Directors—Theodore Cooper, William R. Hutton, Walter Katte, O. Chanute, F. W. Vaughan.

The Indicator Diagram.

By F. F. HEMENWAY.

DIAGRAMS FROM LONG STROKE LINK MOTION ENGINES.

Figs. 36 and 37 represent link motion diagrams from unusually long stroke engines for this kind of valve motion. I am indebted to Mr. M. Meigs, U. S. C. E., and Superintendent of the Des Moines Rapids Canal for the diagrams from which the engravings were made. The characteristics of diagrams from locomotive engines fitted with the link motion are—when the link is pulled up—initial pressure considerably below boiler pressure, initial expansion up to cut-off, and notwithstanding the exposure to cold air is greater than in the instance of most engines, generally a very close approximation of the actual and theoretical expansion curves. The comparison in these respects of locomotive engine diagrams with those shown in Figs. 36 and 37 is interesting.

Those in Fig. 36 are from one of the cylinders of the U. S. steam launch Stella, built under the direction of Mr. Meigs in the Government shops at Keokuk. The valves are plain slide, and links of the locomotive type. Some of the more important dimensions are as follows: Cylinders, 6″×30″; steam ports, 0.4″×4″; exhaust port 0.77″×4″; bridges, 0.35″; steam lap of valve, 0.32″; exhaust lap, 0.11″; travel of valve, 1.44″; steam pipe, 1½″ diameter; exhaust pipe, 2″ diameter.

The revolutions per minute were about 30, boiler pressure 110 lbs. The initial pressure is but a trifle below boiler pressure, the effect of reducing the travel for short cut-off not being noticeable on the admission line except by the increase of lead, nor at all in the steam line, which is equally good for all grades of expansion represented. As the travel is shortened for the shorter grades of cut-off the slower and lesser opening of the exhaust does not permit the steam to escape so freely, increasing the back pressure slightly at and near the beginning of the return stroke, the earlier exhaust opening not compensating for the slower opening. Were the engines used at short cut-off, and especially at higher speed, the result would be better if the exhaust lap was reduced. I understand, however, that they are used almost entirely with the lever in the last notch, corresponding to a cut-off at about three-quarters stroke, at which the diagrams show the back pressure to be small, and that caused perhaps by exhausting through the heater.

It will also be noticed that the link is not arranged to cut-off equally on both strokes of the piston, but as this variation would not be great at three-quarter stroke, where it is mostly used, and as its equalization for shorter cut-off would very probably result in increased slip (and wear) of block it is better as it is. The points of release and exhaust closure are well taken care of, and altogether the link motion gives, under the conditions in which it is used, very good results indeed.

The clearance is eight per cent. of the displacement, that between the piston and cylinder head being one-half inch. This I should suppose could be reduced to one-quarter inch with satisfactory results, by pinning pieces one quarter inch thick to each head. This would reduce by so much the loss from clearance, and raise the compression a little, which at late cut-off would be an advantage.

It was said at the beginning that a characteristic of diagrams from link motion locomotives at high speed, and early cut-off was good expansion curves. Points are indicated on the right hand diagram in Fig. 36 through which the theoretical curve, if drawn from *a*, would pass. They show a large variation between the theoretical and actual curve. If the theoretical curve were drawn from the point of cut-off on this diagram it would be found at the end of the diagram to be five or six pounds below an extension of the real curve beyond the point at which exhaust opened to the end of the diagram. This is the result of slow piston speed and few revolutions, and is unavoidable in this type of engine. It undoubtedly represents the use of more coal to do a given amount of work than would be required under more favorable conditions, but can it be called a loss until some way has been devised to remedy it, that, under the circumstances, is not open to more serious objections?

Fig. 37 is from the same type of engines in the U. S. launch Iris. The cylinders are of the same diameter, but lengthened so as to give a stroke of 40″, to get more piston speed. Revolutions 33, steam pressure not known. The clearance is given at 85.9 inches—13 per cent. of piston displacement. The most noticeable feature of these diagrams is the failure of compression to bring up the pressure in the cylinder. The exhaust was closed at about two-thirds stroke, and even with the great amount of clearance compression should have been 20 lbs. higher

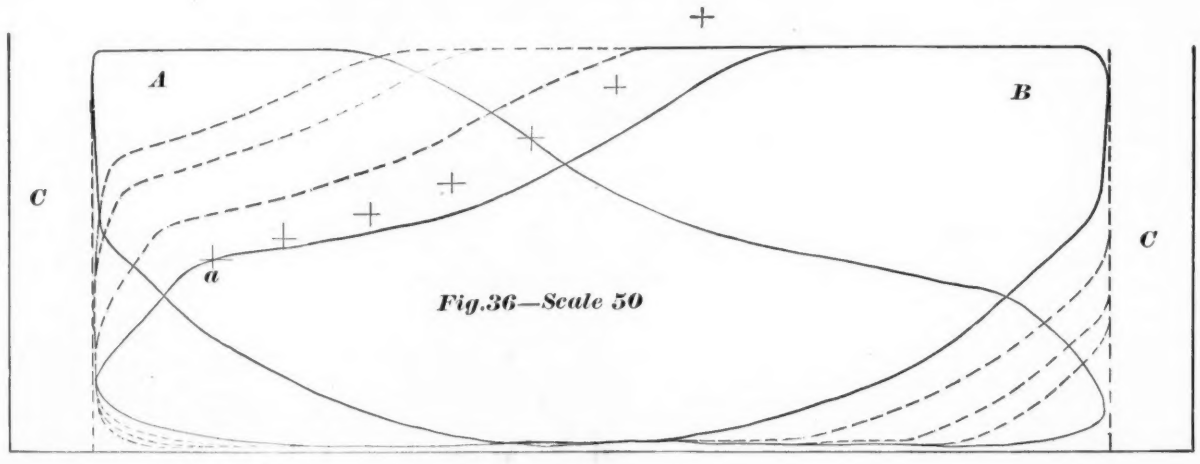


Fig.36—Scale 50

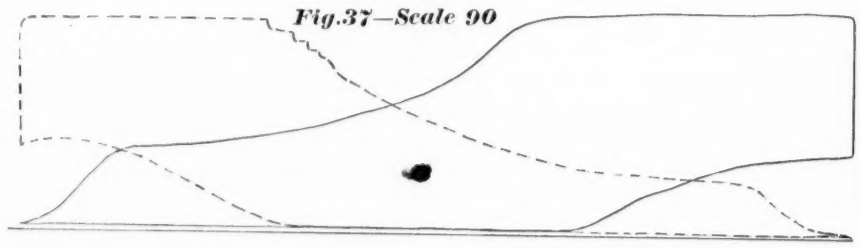


Fig.37—Scale 90

than it is. The slow motion, giving so much time for the loss of heat, and the great proportionate amount of clearance space to be heated, condensed the steam, thus preventing the rise of pressure. In the left hand diagram the compression curve actually falls near the end of the stroke. This *may* have been caused by leakage, but the probability is it was caused by condensation of steam from the abstraction of heat by the metal surrounding the clearance space. As $\frac{13}{16}$″ of the clearance is between the piston and head, there is no question as to the propriety, in an economical point of view, of reducing it by substituting a thicker piston or lining up the heads.

Electric Light Shadows.

By JAMES F. HOBART.

Starting an electric light plant is much like starting any machinery just erected. Often something has been overlooked, a connection has started off, or broken, and it needs all a man's faculties to discover the cause of the trouble.

A plant for running 200 Thomson-Houston lamps of 200 candle-power each, makes a neat concern. Two 16-foot boilers, 5 feet in diameter, set with the Jarvis furnace, will furnish ample steam for running eight dynamo machines through four Armington and Sims' high speed engines rated at 50 horse-power each.

The dynamos should be belted two to each engine by double leather belts 8″ or 10″ wide. All electric light machines should be mounted upon jacks to admit of their being moved away from the engine to tighten belts when necessary. Counter jacks are also necessary to line the dynamo, so the belt will run true. The jack is usually a $\frac{7}{8}$″ or 1″ screw passing through a cross bar and bearing against the armature frames. The counter jacks are two ½″ set screws, each bearing against a leg at opposite corners of the machine. They are so placed that the pull of the belt keeps the machine snug against them all the time.

Transmission by belts must be practically positive for electric lighting, and the use of jacks reduces it almost to an "exact science."

It does not pay to shut down a dynamo to take up belts. Once started it must run until daylight, or have forty or fifty subscribers come up next day and order out their lamps.

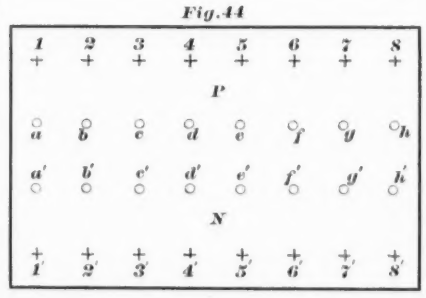
One night I recollect a dynamo man getting his pants caught on a set-screw. We were running 10 light dynamos, belted from a counter shaft, the end of which was within 10″ of a partition. The shaft ran 500 revolutions per minute. The man had on a navy blue suit when he got caught, but in ten seconds he found himself lying against the partition unhurt, but with no clothing on except his shirt collar and stockings. The counter shaft had on the balance of the suit, and it wore them all night too.

All machinery needs to be kept at work in order to make it pay, but the rule is strikingly applicable to electric lighting. A stop of even five minutes is enough to run the stock down five points, and many interruptions will prejudice the public forever.

The connections for distributing the current are a study in themselves. Brains count every time in electric running, and the man who can use the largest quantity, and furnish them too, is the one who gets to the front.

The switch-board for this plant will look

Fig.44



like Fig. 44. The lines go out at the top row of figures and come back at the bottom. For instance, line 1, the positive wire starts at 1, in the upper left hand corner, runs to the various lamps upon the circuit and comes back and ends at 1′. Thus if connection be made between 1 and 1′, the circuit is closed. The other lines do the same, positive at 2, 3, 4, etc., the negative or return at 2′, 3′, 4′. The dynamos are connected in a similar manner with the sockets *a*, *b*, *c*, and *a′*, *b′*, *c′*. Plugs to fit these sockets are connected by insulated wire with all the terminals 1, 1′, 2, 2′, etc. To connect 1 with *a*, place plug connected with 1 in socket *a*, and the connection is made.

When all connections are made in the line through lamps, switches, etc., the lines must be tested for breaks and grounds. A common magneto bell is used, such as is used with the Bell telephone. Connect the wires of the magneto with the terminals 1 and 1′, and turn the crank, if it rings you may depend on a closed circuit and that all is well on the line.

There is one chance in a dozen, however, that there may be trouble with the carbons and its existence not be detected by the magneto, but this can occur only after the carbons have been partially used. If the carbon pencil contains a little silica, it *may* get left on the point, and prevent the carbons coming in contact. The silica will conduct current enough to let the magnets ring when testing the line, but the resistance is so great that the current from a dynamo cannot pass and establish the arc. This point can only be determined by an actual test, or "flashing the circuit" that is starting up and trying the lines.

If the magnet tests pronounce the line perfect, then test for grounds. Connect the magneto with the line and also with the water pipes, or some good ground. It *will not* ring this time if all is right. A few slight grounds do not amount to much as far as the light is concerned, but they make it very dangerous for all hands connected with the plant. A person standing upon the ground and touching *one* naked electric wire is apt to get a good smart shock; with a 50-light dynamo he will get all he wants if his ground connection is good, but he never will get a dangerous quantity. It seems to be simply *static* electricity, and is of no use toward lighting.

If, however, the line is grounded anywhere, the person touching a wire would get a shock that might prove fatal. In the dynamo room, nails in the floor often make connection between a man's boots and moisture beneath the floor, and a shock from static electricity is sustained upon touching certain parts of the dynamo, either by an oil can in oiling up, or in feeling for hot bearings, etc.

A dry wooden platform should be laid around each dynamo, and before the switch board. With a ground in the line, the trimmer is in constant danger, if trimming while the current is on.

If the magneto shows trouble, it must be hunted up and repaired. When the line man is looking for breaks or grounds he takes the magneto with him, leaves the circuit closed on the switch-board, and cuts out each lamp in turn, and makes tests with remainder of the line. In this way the trouble can be located, which is nine-tenths of the whole work of repairing.

In starting a station there are generally but few lamps upon each line, and one or two dynamos will run the whole. Now, if lines 2, 3, 5 and 6 were to be run with dynamos, *a* and *d*, the connections upon the switch-board would be as follows, viz.: Plug 2′ is put in *a′*, 6 in *a*, 6′ and 5 are connected together; then plug 5′ in *d′*, 3 in *d*, 2 and 3′ connected, which makes a continuous circuit though the four lines and two dynamos, connected in "multiple arc" or for "intensity."

Had the lines been connected all through as *a*, 6, 5 to 6′, etc., the connection would have been in series, or for

quantity, and the quality of light been very different.

If, during the night, all the lights are cut out in the line 6, 6′, it may be cut out of the circuit without stopping or dimming a single light. With a piece of insulated wire, connect 5 with *a* then disconnect plug 5 at 6′, 6 at *a*, and put plug 5 in socket *a*, remove the insulated wire, and it is done. In this way any combination can be made when running. If an engine or dynamo give out, it may be cut out, and a sound one put in its place without disturbing the lights.

It is dangerous work, however, be as careful as you may. If ground exist, it is doubly dangerous, and dry wood floors or rubber mats are absolutely necessary for safety.

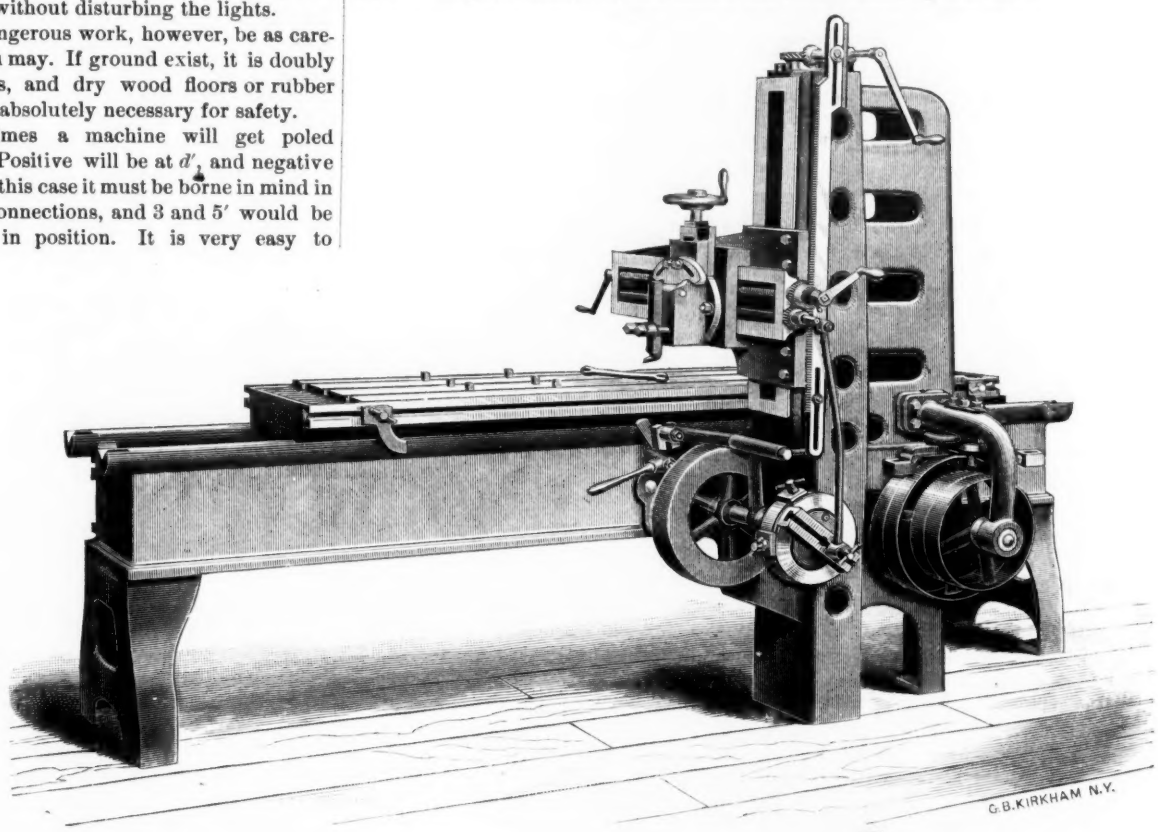
Sometimes a machine will get poled wrong. Positive will be at *d′*, and negative at *d*. In this case it must be borne in mind in making connections, and 3 and 5′ would be removed in position. It is very easy to remedy this blunder, and should be done at the first chance you get. Before starting for the night, connect *a* with *d′*; *a′* with *d* and run both machines slowly, but with the circuit between the field magnets closed in dynamo *d*, which is wrong, and open in *a*, which is polled right. This changes the polarity of the dynamo in two minutes, and you can connect up for the night and go ahead rejoicing.

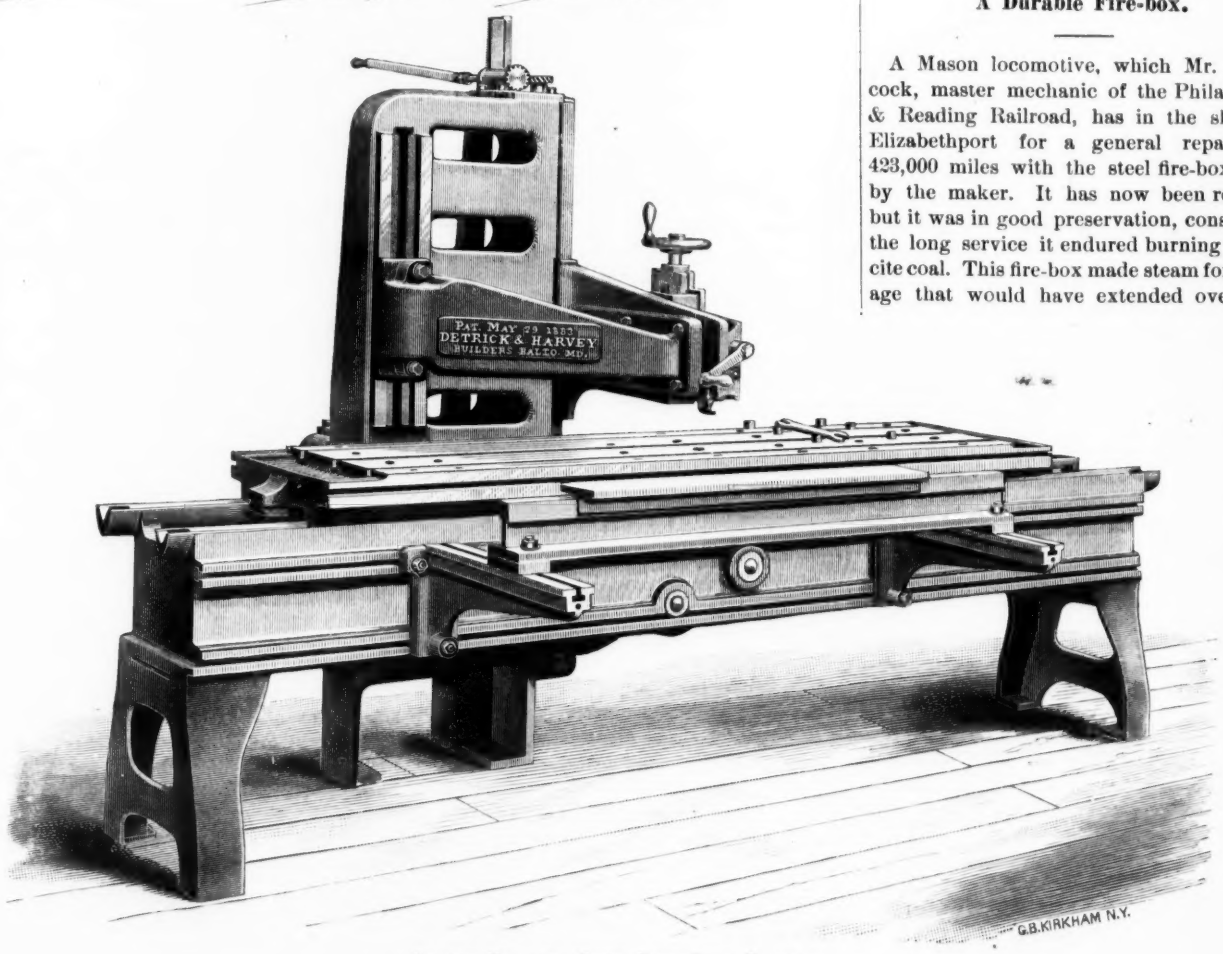
Another bad catch I have seen played on the electric light folks. One day the line men had been testing around the switch-board. They left the plugs in such a manner that when the engineer started up to warm his engine, it changed the polarity of two dynamos; they happened to be connected just right and their plugs in. When the dynamo man came in, he righted up the switch-board, put the plug in the one dynamo and when the engineer started for the night, he happened to pull one of the other plugs first, thus changing the one machine, making all of them *P*, when they should be *N*. This state of things would soon raise the mischief with the lamps. The positive carbon burns out twice as fast as the negative one, and, as the upper carbon is always connected positive, it must needs be the longest. Short pieces in the lower holder last a long time, as they have but about $\frac{3}{4}''$ per hour, the upper, or positive burning $1\frac{1}{2}''$ in the same time.

Upon a change of polarity, the lower carbon burns the fastest, and soon burns out, and will burn the holder too, if not looked after. In the case above, the trimmer was soon heard from. He had been patrolling the lines and discovered a light burning brass instead of carbon. To remedy the defect for the night it was only necessary to change the plugs in *d* and *d′*; also in *a* and *a′*, and the next day the polarity of the dynamo could be changed back again.

A Traction Increaser.

The Locomotive Improvement Company, Toledo, O., which proposes to increase the tractive power of locomotives by means of a device for transferring part of the weight of the tender to the engine, has recently had a locomotive built at the Rhode Island Locomotive Works for the special purpose of experimenting. It is proposed to run with this engine a special freight train right through to the Pacific coast, the object being to demonstrate that an eight-wheel locomotive, when equipped with a good traction increaser, can pull as heavy a train as a Mogul or ten-wheel engine, and do the work at less expense. In many quarters there is a strong antipathy against the large types of freight locomotives, and should this traction increaser act satisfactorily, it may protract the reign of the eight-wheel locomotive.





SINGLE POST OR OPEN SIDE IRON PLANER.

Single Post or Open Side Iron Planer.

Since our first illustration of this machine, some two years since, it has been so changed as to make another description desirable. It will be seen that this differs from the ordinary planer, in that it has one open side, all the driving, tool-holding and feed mechanism being worked from the post side, making its operation as easy as that of the ordinary planer.

The post is so designed and proportioned as to resist deflection when the tool is cutting. It extends to the floor, making one of the feet of the planer. The bed where the post is bolted also extends to the floor, giving a broad surface for bolting them together.

The cross-beam is heavy, and takes a wide bearing on the post. It is rigidly supported by a bracket extending back to a slide on the post; this bracket moves with the cross-beam, up and down.

The faces of the cross-beam and of the post are made alike, so that the saddle can be used on either. Thus, when the work to be done is of such dimensions that it will not pass the beam, the latter can be removed and the saddle placed on the post. The tool-box has a vertical movement and feed from top to bottom of post, permitting the planing down of deep surfaces.

On the open side, opposite the post, are two **T** slots extending the entire length of bed, to which brackets are bolted. Upon these brackets is a rail or track, which can be adjusted towards or away from the bed. A table, corresponding in height to the planer platen, slides on this track. This can be used for supporting long or wide pieces of work, or will serve as a pivotal point for planing segments of circles. The sliding table is moved simultaneously with the platen by bolting work to it, or it may be moved by connecting rods.

A frictionless feed, which only consumes power when feeding, is used, the balance of the stroke being perfectly free. It is operated directly from the driving shaft. The tool has horizontal, vertical and angular feed, automatic in either direction, and capable of any variation up to one-half inch horizontally and one-fourth inch vertically; high belt velocity, and belt shifter entirely independent of feed gear. Two belts, separately shifted, cause forward and backward movement. In addition to the planing of ordinary work, this machine will take in pieces of great width, the outer end of such pieces being supported by the supplemental or sliding table. The ends of long pieces may be planed in the same manner.

The planer is built to set either parallel or at right angles to line shaft, and is powerfully geared. Back speed is three to one. It is built in different sizes by Detrick & Harvey, Baltimore, Md.

The sixth annual meeting of the Michigan Engineering Society will be held in Lansing commencing Tuesday, February 17, and continuing until the evening of the 19th.

The *Workingman's Journal* at Muskegon accuses a flour and feed firm there of having a very valuable cat, which steals on to the scales and remains there until the grain has been weighed.

A Durable Fire-box.

A Mason locomotive, which Mr. Woodcock, master mechanic of the Philadelphia & Reading Railroad, has in the shops at Elizabethport for a general repair, ran 423,000 miles with the steel fire-box put in by the maker. It has now been removed but it was in good preservation, considering the long service it endured burning anthracite coal. This fire-box made steam for a mileage that would have extended over more than thirteen years in the by-gone days when a locomotive was reckoned to do one hundred miles run every week day. As it was the mileage had to be performed in little less than half the time, and the probability that the even temperature obtained by keeping the engine almost constantly in steam contributed to the durability of the steel sheets. The mileage made in eight years represented about seventeen trips round the globe, or more than two journeys of that length every year. The fire-box was made from the best steel the makers could select, and the result showed that they hit upon the right quality.

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NEW YORK, FEBRUARY 14, 1885.

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Reform Needed in the Patent Office.

The American Society of Mechanical Engineers have issued a circular to be sent to members of Congress, urging them to support a measure for the reform of the United States Patent Office. This is a subject in which every friend of American industry ought to be interested without the stimulant of public circulars and private solicitation. There is nothing more certain than the fact that the immense strides made by American manufacturers within half a century are due in a great measure to the beneficent operation of wise patent laws. There is also nothing more certain than the fact that the Patent Office, as now conducted, has fallen far behind the requirements of the nation's progress. Inventors who pay liberally for getting their business attended to promptly, are daily put to great delay, inconvenience and useless expense, because investigations and examinations that the Patent Office officials ought to complete in a few weeks are protracted through many months. If inventors were asking gratuitous favors from the Government, there might be some excuse for attending slowly to their business, but the fact is they have paid in some three millions of dollars that has not been expended, yet the Patent Office is permitted to drag along short of help. The delay in getting patents granted after the application has been made does not by any means represent the full inefficiency of the establishment. Owing to the work being chronically greater than the means of doing it well, there is good reason to believe that many investigations are very imperfectly made. Every week patents are granted on devices that have received wide application in industrial operations at different times, and the only explanation we can see of these palpable blunders is that the officials have not time to do the work properly. This condition of matters is far-reaching in its evil effects, and does serious injury in many lines of business.

Were all the funds that legitimately belong to the Patent Office devoted to sustaining efficiency of that establishment it could be maintained in a way that would reflect credit on the country and prove a material aid in encouraging original invention. As it is, the force is not only kept too small for carrying on the business, but they are not sufficiently paid to retain efficient officers in the service. Almost any officer who understands the work of the Patent Office properly can greatly increase his income by leaving the Government service and starting business as a patent attorney. The Government receives sufficient fees from inventors to remunerate officers according to their value, and unless this policy be adopted the Patent Office affairs will never be properly conducted. The American Society of Mechanical Engineers recommend that the Commissioner of Patents shall be paid a salary equal to that of United States judges. We would supplement this by recommending that the examiners shall receive a salary at least equal to what a private employer could afford to pay them for their services, and that political considerations should not be the supreme recommendation for a commissioner. If the nation is going to pay that official a high salary he ought to be a man of wide engineering and mechanical experience. From his own knowledge he ought to be able to supervise the working of the office. Were the head of the bureau competent to judge as to the originality of patents we would have fewer ancient devices rejuvenated by the Patent Office seal.

Trying to Checkmate a Gas Monopoly.

A number of citizens of the metropolis have formed what is called the "Gas Consumers' Association of the State of New York." Its objects are stated to be "to obtain, preserve, and circulate information of value to gas consumers and the public generally; to secure adequate inspection of meters so that consumers may get what they pay for—gas being the only commodity which is not habitually measured by standards established and maintained by public authority—and to impose on companies furnishing the public with light such just restrictions as are recognized elsewhere as necessary for gas and other corporations exercising a public franchise where the interest of consumers is not protected by the law of competition, and where the individual citizen cannot successfully maintain his rights against large organizations."

In this era of monopolies, real and imaginary, no kind of corporations are more correctly designated as monopolies than gas companies, and nowhere have the gas monopolies a tighter grip on the public than in this city. The only opposition to the monopoly (except oil) is the electric light, and thus far its field of operations is much restricted. The private gas companies have control of the laying of gas pipes in the public streets in nearly all cities, and if a consumer disputes any bill they choose to render him, and refuses payment, they shut off his gas, take out the meter, and leave his house in darkness. There have been instances where opposition gas companies have run pipes in the same streets, but they usually consolidate after a show of opposition. The gas companies of New York city came to the conclusion, about a year ago, that it was time to shut off all new comers from their field of operation. This they did by procuring the passage of a bill by the Legislature (which the Governor promptly signed) prohibiting the tearing up of streets by any new gas company for the purpose of laying pipes. Then the gas companies consolidated, and virtually said to the public: "What are you going to do about it?"

The Association above mentioned proposes to bring about a new order of things, by procuring the enactment of a law making it the duty of city officials to inspect gas meters and keep the record of gas consumed by each one having a meter, which shall be the amount charged for by the company. This is a good movement, and we hope it will succeed.

When gas is first introduced into a city or village, it should be by the municipal authorities, and the works owned by the people. There is no more reason why private companies should own and control the supply of gas to a city than the supply of water. No private company should control either. In Philadelphia, the second largest city in the Union, both gas works and water works are owned and controlled by the people. So it should be in every city.

A Safe and Convenient Method of Remitting Money.

We take pleasure in calling attention to the money order system originated by the American Express Company, and recently adopted by the United States Express Company, by arrangement with the former corporation.

It possesses all the elements of safety contained in remitting by bank check or draft, without requiring the sender to keep a bank account, the paying office being fully responsible if orders are cashed by the wrong person.

Any one in the large territory worked by either of these two companies can go to any office of either company, and procure a money order payable to the person named the[re]in at any office of any express company in the country, with the single exception of the city. The fee ranges from five cents for sums of five dollars or less, up to twenty cents for fifty dollars. Such orders can be duplicated, in case the originals are lost in the mails or otherwise, by the sender presenting the receipt given with the original order. Express money orders can be deposited in banks generally, the same as checks.

An important convenience is, that in most small towns the express company's agent is also the railroad station agent as well, enabling persons who are employed during the day to procure money orders in the evening, and at hours when banks and post-office money order offices are not open.

The postal note system recently inaugurated by the United States Government, has proven in practice to be not only an insecure but deceptive method of transmitting money through the mails, and we heartily commend the express money order system as a substitute.

Machinists' Lecture.

A course of lectures is being delivered under the auspices of the Kings County Association of Practical Engineers and Machinists in Everett Hall, 398 Fulton street, Brooklyn. The second lecture will be delivered on Monday evening, February 9th, by Angus Sinclair, of the AMERICAN MACHINIST, the subject being "The Locomotive as Developed by American Inventors." There is an impression among those who ought to be better informed, that the American locomotive is merely a development of the Stephenson locomotive; and this lecture will principally be devoted to giving proof that American mechanics and inventors developed the locomotive from the Evans high-pressure engine. Magic lantern views illustrating the development of the locomotive will be given.

In sending a renewal of his subscription for another year, W. H. Knight, of Monckton, N. B., writes us: "I notice under the heading 'Importance of Steam Engineering' (which should be carefully read) some one has suggested that you go rather much into steam engineering. I think that if he were to go carefully through the year 1884, he would be inclined to change his opinion. I have often thought that there was exceedingly good judgment and discriminative ability in the columns of your paper. I am sure you have gone very liberally into machinery, tools, etc.; also devoted ample space to very interesting and instructive controversy. Keep the AMERICAN MACHINIST in the course it has pursued the last year, and it will rapidly increase its number of friends."

Revival of the Truck System.

Some time ago the legislature of Pennsylvania enacted a law for the purpose of making illegal the truck store system which was growing into serious proportions. During the prosperous times when men could find plenty of employment the law worked to check the truck store system which has always been found a degrading curse and stronghold of tyranny wherever it existed. Since the hard times came on the meanest class of labor employers are contriving to evade the law by requiring workmen to take store orders.

Recently considerable indignation was excited in Pittsburgh among the friends of law and order by the decision of a judge, which practically supported the violators of the law against truck stores. By the kind of moral suasion which so many of the coal corporations know how to employ, A. A. Ketterieg had been induced to give orders on a store belonging to the Imperial Coal Company, and the amount was kept out of his wages. Ketterieg was sneaking enough to repudiate his order, and sued the company for the wages kept back. Although the statute expressly forbids men to be paid by anything but legal currency, the magistrate who tried the case held that the store orders were binding and legal. The opposite view had previously been held by other judges who tried similar cases.

Literary Notes.

LOCOMOTIVE ENGINE RUNNING AND MANagement, by Angus Sinclair. John Wiley & Sons. 15 Astor Place, New York.

This book, which is just out, is meeting with a lively demand. Over one hundred copies have been ordered by men on the Central Pacific Railroad alone.

One of the most enterprising of our exchanges is the *Baltimore Manufacturers' Record*. In a recent issue it gave a list of eighteen hundred and sixty-five new enterprises started in the South during the last year, with the location and character of each.

QUESTIONS AND ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

Every question, to insure any attention, must invariably be accompanied by the writer's name and address. If so requested, neither name, correct initials, nor location will be published.

(47) **J. L. H., New York, will find de**scription of exhaust condenser in the AMERICAN MACHINIST of July 22, 1882.

(48) **D. E. C., Worcester, Mass., writes:** I have a lot of tools, scales, etc., which have been through a fire, and are consequently black. What can I use to brighten them? *A.*—We do not know of anything better than oil and emery.

(49) **R. D. K., Rochester, N. Y., asks:** Do they make piston-rods hollow, and if so, why? *A.*—Piston-rods are almost universally made solid. Occasionally they have been made with a central hole with a view to oiling the piston through it, and, perhaps, for some other purposes.

(50) **G. L. L., asks:** 1. Please give me a simple rule for setting the valves of locomotive engines? *A.*—See illustrated article on this subject by Angus Sinclair, in AMERICAN MACHINIST of June 7, 1884. 2. How can I measure fractional screw threads? *A.*—See "Screw Cutting on the Engine Lathe," by Frank H. Richards, in AMERICAN MACHINIST of August 13, 1881.

(51) **G. P., Macon, Mo., asks:** 1. How can I improve scrap brass when melting it for journal boxes? It is generally brittle and hard to work. Will copper improve it? *A.*—It is customary to make journal boxes of new metal. It would be impossible to tell what to add to your old metal because we do not know of what it is composed. We have no doubt copper would improve it. 2. Of what mixture is the bronze composed that is used for patterns? *A.*—Various cheap mixtures are used, as zinc with a little copper, copper and lead in about equal proportions, etc.

(52) **A. B., Providence, R. I., asks:** What is the difference between a Mogul and Consolidation locomotive? *A.*—A Mogul locomotive has six wheels connected, and a pony truck; a Consolidation eight wheels and the same kind of truck. 2. What grade of India ink is most suitable for drawing? *A.*—The best you can buy of dealers in such materials. 3. Where can I find an explanation of the indicator diagram, and how to calculate the the horse-power from it? *A*—You will find this information in the AMERICAN MACHINIST of Feb. 9 and 16, 1884. 4. For answer to questions on the blue process, see AMERICAN MACHINIST of Oct. 8, 1881.

(53) **J. T., Port Deposit, Md., asks:** 1. How much in pounds, as indicated by steam gauge, will it require to equal the pressure of steam on a fruit can under a pressure of 240° of heat for 45 minutes? *A.*—If you mean to ask what the pressure will be in a sealed fruit can heated up to 240°, we should say the pressure due to steam of that temperature, the water being converted into steam in the can, say 10 lbs., by gauge. 2. What will be the increase of pressure if, after filling an empty can with compressed air of 20 or 25 lbs. pressure, as indicated by steam gauge, you then immerse the can in water at a little less than boiling heat? *A.*—You can, for practical purposes, calculate that for every five degrees increase of temperature the pressure will be increased one per cent. 3. What power will it require to run an air pump 4″ diameter compressing air up to 75 pounds pressure? *A.*—It may be operated by the power of one man, or may require four or five horse-power, depending upon how fast you run it.

BUSINESS SPECIALS

Transient Advertisements, 50 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

Katzenstein metallic packing, 169 Christopher st., N Y

Curtis pressure regulator and st'm trap. Jan. 10, p. 11.

Presses & Dies, Ferracute Mach. Co., Bridgeton, N. J.

Steel Name Stamps, &c. J. B. Roney, Lynn, Mass

"How to Keep Boilers Clean." A book mailed free, by James E. Hotchkiss, 86 John street, N. Y.

Herbert W. T Jenner, Mechanical Engineer and Solicitor of Patents, 632 F st., Washington, D. C.

The Young Engineer's Own Book, $3. Edw. Meeks, Publisher, 1002 Walnut St, Phila., Pa.

For Sale—26″ b. g drill presses, quick ret'n, bal. spindles, new, modern tools, $150. S. M. York, Clev'd, O.

$7.00 for 2x4 model engine castings. W. D. Rich, 120 N. 6th St., Phila. Send for circular.

Lyman's Gear Chart. How to lay out gear teeth. Price 50 cents. E. Lyman, C. E., New Haven, Conn.

Foot Power Machinery, for workshop use, sent on trial if desired. W. F. & John Barnes, Rockford, Ill.

The latest Improved Tack and Match Machinery is made by White Machine Co., Waterbury, Conn.

Pattern and Brand Letters. Vanderburgh, Wells & Co., corner Fulton and Dutch streets, New York.

Consulting Engineer and Mechanical expert, C. C. Hill, 84 Market street, Chicago, Ill.

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Cooper, On the Use of Belting, $3.50. Edw. Meeks, Publisher, 1002 Walnut St., Phila., Pa.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

2-horse-power boiler for sale. In perfect order. Price, $75. Apply to A. B. Worth, 147 St, Felix St., Brooklyn, N. Y.

The outline ("wax process") engravings shown in the AM. MACHINIST each week are made by Struthers, Servoss & Co, 32 Frankfort Street, N. Y.

Engine Lathes, Hand Lathes, and other fine tools. Assortment large: prices low. Frasse & Co., 62 Chatham St., N. Y.

Farley's Reference Directory of the Machinists, Iron, Steel, and Metal-Working trades of the United States. A. C. Farley & Co., Philadelphia, Pa.

Improved Tack Machinery, made by The Willets Man'f'g Co., can be seen in operation at their works, 57 Clifford St., Providence, R. I.

The Complete Practical Machinist, $2 50; the Pattern Maker's Assistant, $2.50; Mechanical Drawing Self-taught, $4 00; books for practical machinists. Address, Joshua Rose, Box 3,306, New York City.

EXTRACTS FROM CHORDAL'S LETTERS, 400 pages, 12mo, handsomely bound in cloth. New and enlarged edition, with over 50 illustrations. Price $2. Published by John Wiley & Sons, 15 Astor place, New York.

Dixon's Plumbago Facing or Blackening. Competition is everywhere driving foundrymen to produce smoother castings. This can be well and cheaply done by the use of Dixon's Plumbago or black lead as a blackening or facing. Jos. Dixon Crucible Company, Jersey City, N. J.

Locomotive Engine Running and Management. By Angus Sinclair. Price $2. An excellent book for men interested in steam engineering, valve setting, designing valve motion, the care of the Westinghouse brake, etc. Published by John Wiley & Sons, 15 Astor Place, N. Y.

Useful Information for Steam Users—A 100-page pamphlet, on the care and management of the steam engine and boiler, with hints and rules for engineers and firemen. Every engineer should have this book. Send 25c. in P. O. stamps to the J. N. Mills Publishing Company, 145 Broadway, N. Y.

MANUFACTURES.

B. F. Wilson, Birmingham, Ala., is endeavoring to work up a $10,000 foundry company.

The Toledo, Ohio, Bolt and Nut Company have increased their capital stock from $50,000 to $100,000.

Samuel Self, Brooklyn, N. Y., will erect a factory 50x58 feet, on Quincy Street, to cost $45,000.

Niles and Benton Harbor, Mich., are anxious to secure new manufacturing establishments.

George Braun, Denison, Texas, will erect a $35,000 ice factory in that place.

George Hay, 331 Broome Street, New York, will build a factory on 169th Street, to cost $9,000.

W. H. Shower & Brother, Manchester, Md., will remove their machine shops to Westminster, Md.

Fred Bauer, 594 Broadway, New York, will build a 5-story factory, 50x50 feet, on 31st Street, to cost $14,000.

The Agricultural and Mechanical College, Auburn, Ala., will put in machinery for practical mechanical work by students.

It is reported that the Mary Pratt Furnace Company, Birmingham, Ala., contemplate building another furnace shortly.

The Birmingham (Ala.) Agricultural Works are nearly completed, and will soon begin to make plows.

W. L. Cutting, 24 West 22d Street, New York, will soon build a four-story factory on 42d Street, to cost $35,000.

It is reported that the Chesapeake & Ohio Railway will erect two new shops at Paducah, Ky., in addition to those lately put up.

L. S. Dawes, Cedar Keys, Fla, will remove to Tampa, Fla., where he contemplates starting a machine shop.

The woolen mill of Myers & Wyatt, Princeton, Ky., which was recently burned, will be rebuilt and new machinery put in.

H. C. & H. A Harman, Union Bridge, Md., have purchased ground on which to erect machine shops.

The New York, Philadelphia & Norfolk Railroad Company are building round-house, etc., at Cape Charles City, Va.

Joliffe & Estill, Lexington, Va., have bought out the machine shop and foundry of T. B. Mullen at that place.

The Lake Shore Railroad will immediately rebuild their shops at Collingwood, Ohio, recently destroyed by fire.

The Troy Mowing Machine Company's works, on Center Island, Troy, N. Y., started with seventy-five men. William Kemp, Jr., will act as superintendent.

D. McClure, of Natchez, Miss., is erecting an extensive building in that place, which will be used as a foundry and machine shop.

An addition of 150x25 feet, one story in height, is being made to the Long Island Railroad machine shops at Long Island City, N. Y.

The Columbus, Ga., Iron Works, have added a 20-horse-power Westinghouse engine to run the machinery in their pattern-making department.

A fire in the milling and drilling room of the Whitney Arms Company, New Haven, Conn., Jan. 24, destroyed machinery to the value of $50,000, which will no doubt be replaced by new machinery.

It is reported that the Wilmington & Weldon Railroad Company has purchased 8 acres of ground at Rocky Mount, N. C., with a view of erecting repair shops for their road.

The Philadelphia Textile Machinery Company, of Philadelphia, Pa., has been organized with a capital stock of $50,000. Treasurer, S. A. Kensal, 1324 Brown Street.

The Columbia Paper Mill Company, Portland, Oregon, are building paper mills. H. L. Pittock is President, and Samuel Irwin Superintendent. Water-power is used.

The Pennsylvania & Schuylkill Valley Railroad Company will build a round-house at the Franklin Ave. station at Norristown, Pa. Probable cost, $10,000.

The E. T. Barnum Wire Works, of Detroit, Mich., have increased their capital stock to $400,000, and the Michigan Malleable Iron Company, of same city, have increased to $150,000.

The Heine Safety Boiler Company, of St. Louis, has been organized with a capital stock of $100,000. It will continue the manufacture of the Heine water tube boiler with largely improved facilities.

During a recent rain storm the raceway of the Seymour Manufacturing Company, at Seymour, Conn., was washed away for a good many feet, and it took several days and much help to fix it.

The Edinburgh (Va.) Manufacturing Company, recently organized with $200,000 capital, are erecting works for the manufacture of agricultural implements.

At Portland, Me., nearly all the exterior of the building to be used by the Portland & Ogdensburg Railroad as a machine shop is completed, and workmen are now busy in the interior of the building.

The St. Louis Malleable Iron Company made a heavy shipment of blacksmiths' supplies to Rouen, France, last week, and report large sample orders for their steel water fronts for stoves and ranges. —*Age of Steel.*

The Lancaster Watch Factory, at Lancaster, Pa., will soon be removed to Chicago. A Bitner, late manager and principal owner, has accepted an offer of $350,000 from Chicago capitalists, and will carry on the works in that city.

The Chicago Safe and Lock Company are a new concern fitting up a new shop at 209 South Canal Street, Chicago. There are two floors, 200x80 feet, which will be fitted with a full line of machinery B. H. Campbell is President, and Henry Gross, Master Mechanic.

The firm of Willingham & Company, who have been doing an extensive business in the manufacture of sash, blinds and doors in Columbus, Ga, for several years past, having bought ground in Chattanooga, Tenn., will erect large factories and remove their business to that city.

The Knights of Labor Co-operative Hat Company, of Nashua, N. H., and Haverhill, Mass., has been incorporated for the manufacture of hats. Capital stock, $25,000. James F. Minchin, Charles J Fulton, Frank H. Foster, C. F. Wilson, and R. St. Onge, of Haverhill, Mass., incorporators.

The Acushnet Cotton Mill, of New Bedford, Mass., will institute weekly payments at once. The Potomska cotton mills will undoubtedly follow. Agent Kent, of the Grinnell cotton mill, says that the mill will fall into line if the above-named mills do so.—*Boston Commercial Bulletin.*

The shops of the Billings & Spencer Company, at Dividend, Rocky Hill, Conn., have been greatly improved, and a large, new brick building recently added, which they propose to put in full operation at no very distant day, for the manufacture of drop forgings.

Dean Brothers Steam Pump Works, Indianapolis, Ind., build special distillery pumps adapted to the particular service required about a distillery. They are selling a great many of these pumps, and have issued a circular giving a list of their pumps used in a number of large distilleries, with sizes of each pump.

The Spencer Manufacturing Company, formerly John O. Spencer, Son & Company, Waterloo, N Y., has been incorporated for the purpose of manufacturing threshing machines, steam engines, etc. Capital stock, $125,000. John O. Spencer, C. J. Ryan, J. B. McDonald, O. J. Spencer and John A. Gross, trustees.

The United States Bung Manufacturing Company has been incorporated in the State of New York, with $200,000 capital, to build a factory in Cincinnati, Ohio. Among the trustees are Rafael Pentlarge, William Beeston and Frederick Pentlarge, of Brooklyn, N. Y., who are experienced bung manufacturers of that city.

C. W. Charlton, of Knoxville, Tenn., is corresponding with different parties who contemplate the erection in that city of steel works, a planing mill, a cooperage factory and an ax handle and tub factory, while O. G. Vanderhoof, of the same city, reports that a $25,000 tool factory will be established

It is stated that a number of the old employes of the Westlake Rolling Mill, at Warren, Ohio, are considering a plan for a co-operative company, wherein they propose to unite with local capitalists in starting the mill, which has been idle some months. The property is in the hands of an assignee.—*Industrial World.*

Watson & Stillman, Manufacturers of hydraulic jacks, presses, punches and shears, 470 Grand Street, New York, write us: Our business for the year 1884 was less in amount than in 1883, as some of our lines were quite dull, and the margins, of necessity, smaller. Our improved hydraulic jack, patented during the year, is, considering the times, taking very well. Many good and favorable opinions have been given upon it by those most capable of judging on such a tool. We are looking for a much larger business this year, and shall probably bring out several new tools in our lines.

The Oneida Steam Engine & Foundry Company, Oneida, N. Y, write us: "Our business for the past year has been fair. Our little giant improved has taken so well that in drill chucks we have doubled the sales of any previous year. We have added two sizes, viz: No. 3 and No. 4, holding from 0 to 1½″ and 0 to 2″, respectively. They make good cutting-off chucks, as well as good drill chucks. In lathe chucks we have added the "Westcott" independent chuck and "Westcott's" cutting-off chuck to our list. With these additions we can now meet the requirements for nearly all kinds of chucks. Business is picking up a little, and inquiries are abundant and prospects better for a good trade than last year at this time.

The *National Labor Tribune*, of Pittsburgh, Pa., says: "The outlook and the general volume of the iron business has not improved any within the last two weeks, but the feeling is a little better than it has been. Last week a Cincinnati man was in this city with an order for 2,500 tons of corrugated iron that he wanted filled, but none of our manufacturers took it at his figures. For some grades of iron there is a better demand; the main one is for iron and steel sheets. Nails are the dullest of anything in the market. All the factories are still closed, and none are expected to start up for a month or more. There is a great deal of talk among the men about idle mills being started up, which often gets into the daily papers. The *Labor Tribune* has the most reliable source in getting at such facts."

Frank H. Pond, of the Pond Engineering Company, St Louis, Mo., writes us: Your favor of the 23d of December, asking for particulars about the condition of business during 1884 and prospects for 1885, came to hand while the writer was absent on an extended business trip through the South, Southwest and West, from which he returned only a few days since. From careful observation and conversation with business men in those sections of the country, we have formed the following conclusions: That business generally is gradually improving on a solid basis. In the South business is rapidly improving, as they are satisfied "the war will be over on the fourth of March." The Southwest is improving as rapidly as possible, after two years' failure of the cotton crop. The West has not really felt the hard times, nearly everybody having done a good business, and in some localities quite "a boom" has been experienced. Our business in 1884 has been fully up to that of 1883. We can see a decided improvement since the first of January, and consider the prospects for 1885 very flattering.

The Ferracute Machine Company, Bridgeton, N.J., write us: We found profits last year about the same as for 1883, but the sales were larger than for any previous year. While business has not been as brisk, we have had our share of work. During some months of 1884 we employed more hands than ever before, and now have more names on our time book than at the beginning of the year, although at present some of the men are not working on full time. During the year we have brought out a new line of punching presses, which have flywheel at back, and are adapted for boiler punching and other heavy work. We have added a 2 story pattern and box shop, and a fireproof house for storing patterns to our buildings, and have started an additional machine shop in the old pattern shops. We have also added to our machinery a large lathe, slotting machine, milling machine, horizontal boring machine, grinding lathe, shaper, and welding furnace in forge shop, besides a number of special tools for facilitating the manufacture of our presses. We think the prospects for a moderate business during 1885 are good.

The Harrison Safety Boiler Works, Philadelphia, Pa., write us: "Having doubled our business during 1884, we feel that we should be well satisfied, although, doubtless, had times been brighter, we should have done much more: as it was, we were obliged to increase our works, and are now in better shape than ever before to fill orders. We attribute our increased trade partly to the fact that the peculiar and intrinsic merits possessed by the Harrison steam generator are becoming better and more widely known, and as years roll on the truth and wisdom of Mr. Harrison's convictions are proven beyond question, as boilers can be shown that have been working over twenty years continuously, and partly because we spare no effort to have the material and workmanship of our boilers first-class in every respect, which, with the improvements added, have brought us numerous orders from new customers. Inquiries are comparatively few at present, but we look for an increased business during the coming year, particularly if the general business of the country improves.

Machinists' Supplies and Iron.

NEW YORK, January 29, 1885.

The tone of supply dealers is more encouraging. Prices of supplies are looking upward, and a movement in that direction may soon be expected.

The trade in steam supplies is in much the same condition as machinist supplies, with the volume of business relatively a little better.

Boiler plate and structural iron is not improving in demand, but the dealers expect that the business will get better when the season advances a little.

Iron—The American pig market has not displayed any new features during the week. The demand has been light, but prices have kept steady, and the outlook is considered favorable. Standard Lehigh and North River brands have sold at $18 to $18.50 for No. 1 X Foundry. No. 2 X Foundry is quoted at $17 to $17.50 at tidewater, and Grey Forge at $14.50 to $15.50 at furnace.

Scotch Pig—This iron continues to be very little in demand and prices are irregular, with a tendency to favor buyers. We quote Shotts $21.50 to $21.75 to arrive; Coltness, $21.50 to $21.75 to arrive; Glengarnock, $19.50 to arrive; Gartsherrie, $20.50; Summerlee, $20.50; Carnbroe, $19 to arrive; Eglinton, $18.50; Langloan, $21, and Dalmellington, $19.

Antimony—There has been no change in the value of Regulus, and the demand is light. Hallett's is quoted at 10 cents, but buyers can obtain slightly easier figures. Cookson's has been nominally held at 16.40 cents.

Copper—The demand for ingot has been light, but the market has been steady and prices are improving. Lake has sold at 11¼ to 11⅝c., and other brands are quoted at 10½ to 11c. The break in the pool is not likely to lead prices any lower.

Lead—Pig is a trifle firmer than it was when our last report was made. There has been a fair demand, with light offerings and a steady market. Prices rule from 3.65 to 3.70c.

Tin—The market for ingot has been dull, yet prices are firm, with an upward tendency. We quote, for jobbing lots, Banca, 19c.; Straits and Malacca, 17.40c.

✻WANTED✻

"Situation and Help" Advertisements, 30 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday morning for the ensuing week's issue.

Wanted—A patternmaker of experience and ability as foreman. Address J. B., AM. MACHINIST.

An experienced engineer desires a position as chief draftsman or superintendent. Address N. S. S., AM. MACHINIST.

Experienced mechanical draftsman, with a special knowledge of printing presses, wants to make a change. Address Box 863, AM. MACHINIST.

A practical tool maker wants position. Expert on dies and tools for sheet metal goods. Address Box 103, Port Chester, N. Y.

Wanted—Position by mechanical engineer of many years' experience on hoisting and pumping engines, air compressors and mining machinery. Best references. Address Box 1, AM. MACHINIST.

A young man, with experience as machinist and draftsman on a large variety of work, wants position as draftsman. Machine tools a specialty. Address F. A. Foster, Box 2144, Aurora, Ill.

Wanted—A traveler; must be posted in steam engines, and some experience in traveling. Good salary and permanent employment to the right man. No other need apply. Address "Governor," AM. MACHINIST.

Wanted—Position as manager, superintendent or designer, by Mechanical Engineer who has has had a technical education and ten years' practical experience in mechanical work and the above positions. Best references. Ad Box 15, AM. MACHINIST.

Wanted—By a practical machinist, position as foreman or draftsman. Can indicate and superintend erecting work. Work more of an object now than good pay. Expert in building construction. References unquestionable. Address Box 473, Waltham, Mass.

A steam engine, Corliss system, 10-inch cylinder, 24-inch stroke, only used for a short time, for sale by Keuffel & Esser, 127 Fulton Street, New York.

For Sale—A nickel-plated Richards indicator, with two springs. In perfect order and but little used. Cheap. Apply to "H.", G. M. I. Works, Bath, Me.

For Sale—Foundry and Machine Shop in city of 3,500 inhabitants. No competition east or west for 100 miles. On St. Louis Air Line R. R. This can be bought at a bargain. Address James B. Gamble, Princeton, Indiana.

A good machinist, who can command from $7,000 to $8,000, can secure a first-class opening in an established business in Montreal. Address for particulars, Hanson Bros., Financial Agents, etc., 178 St. James Street, Montreal, Canada.

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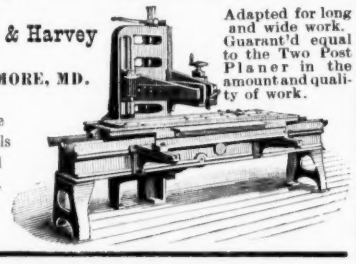

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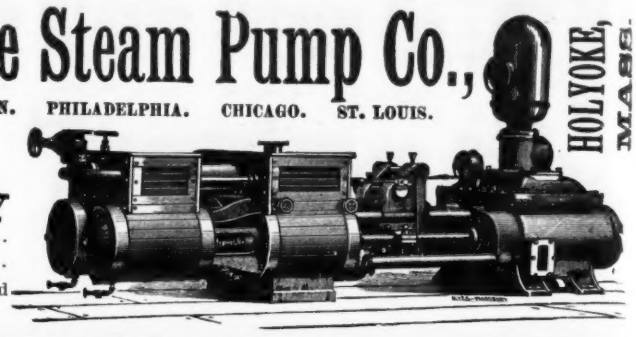

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MADE BY ANY OF THE FOLLOWING MANUFACTURERS
Can Save 25 Per Cent. of its Cost
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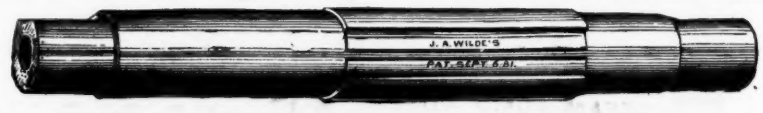

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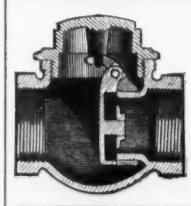
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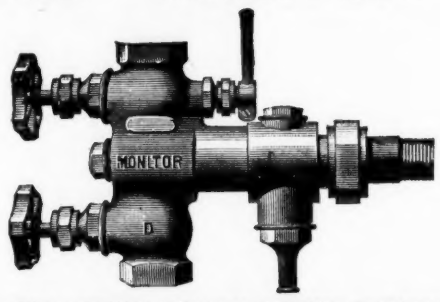

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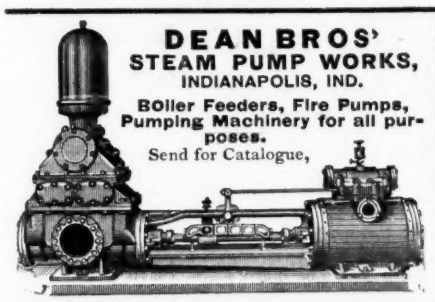

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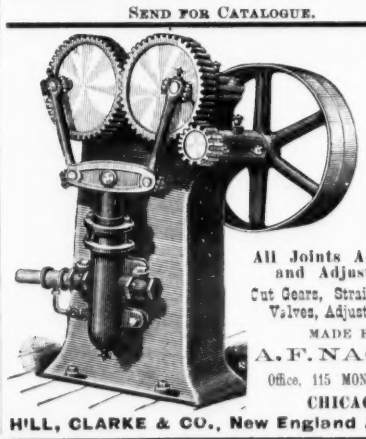

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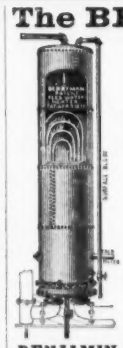

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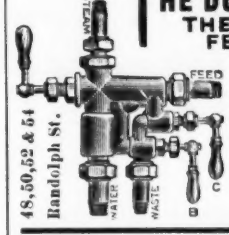

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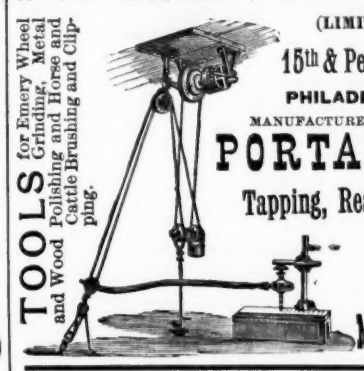

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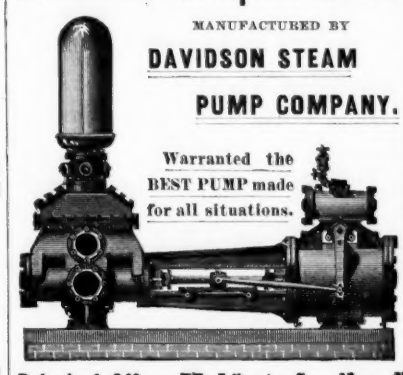

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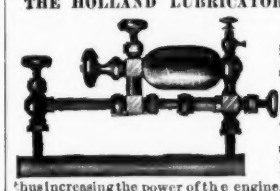

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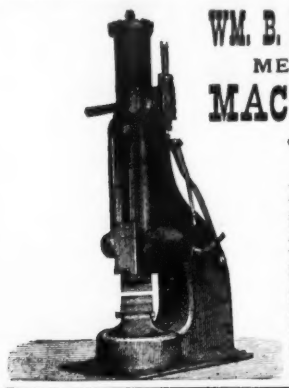

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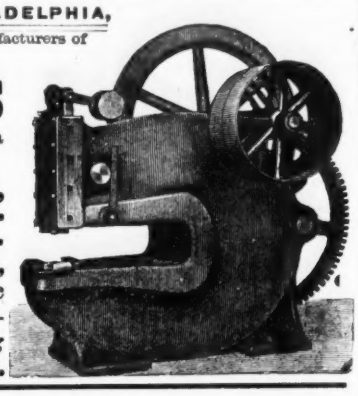

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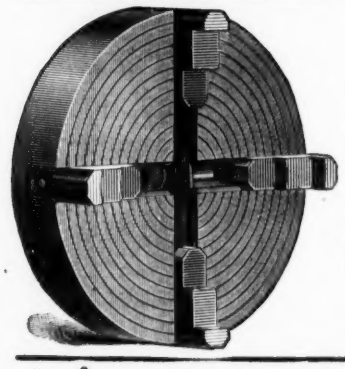

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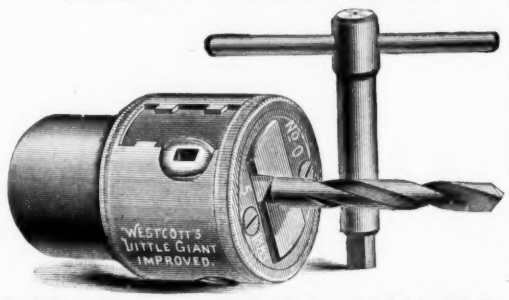

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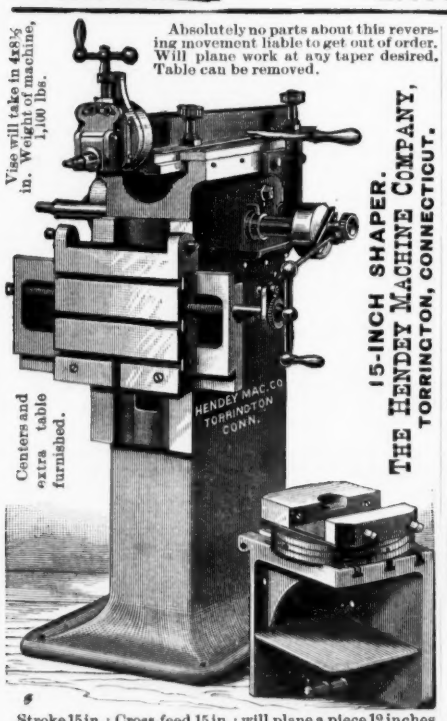

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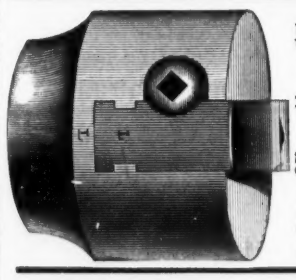

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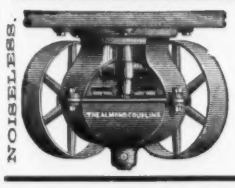

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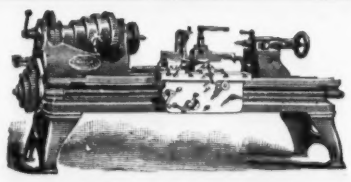

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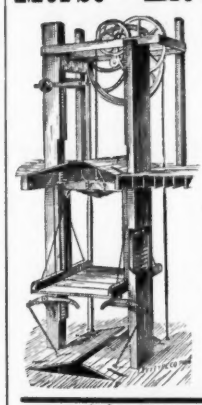

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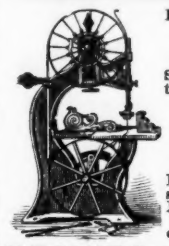

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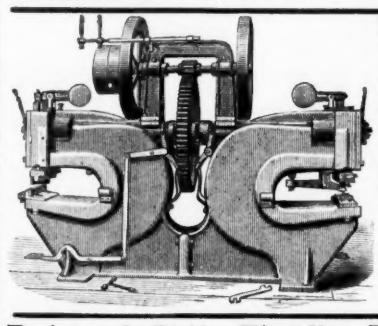

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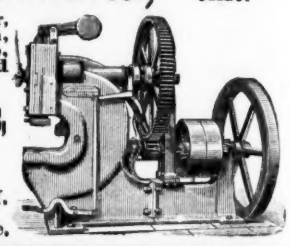

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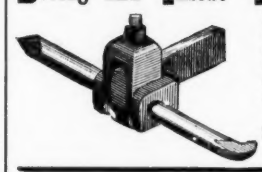

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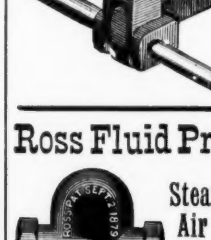

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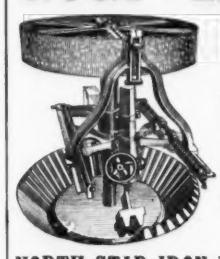

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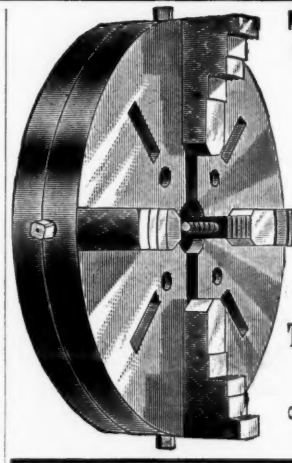

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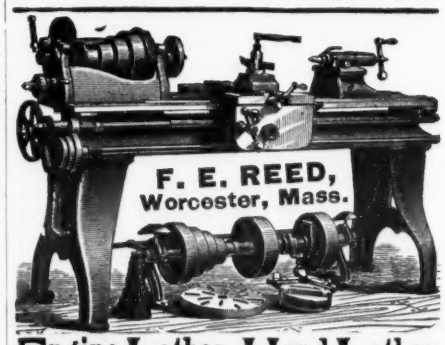

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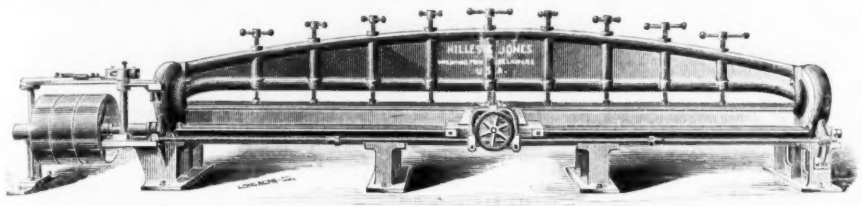

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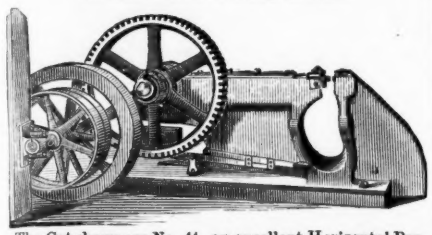

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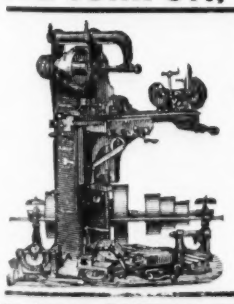

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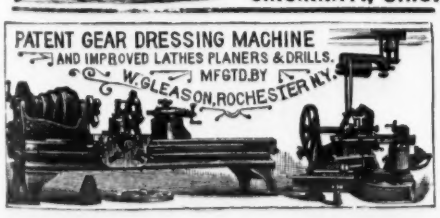

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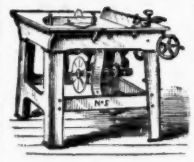

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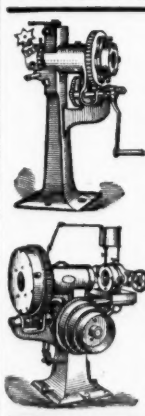

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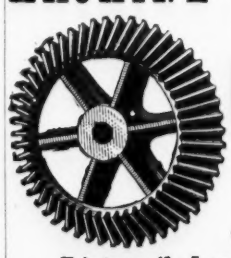

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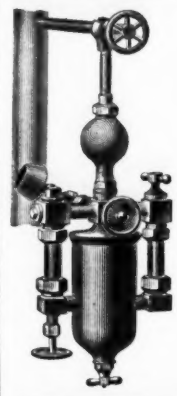

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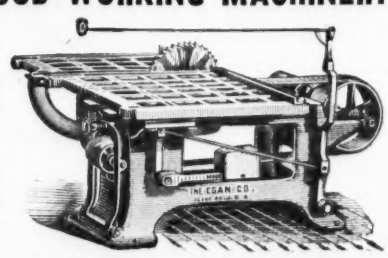

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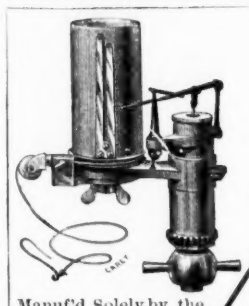

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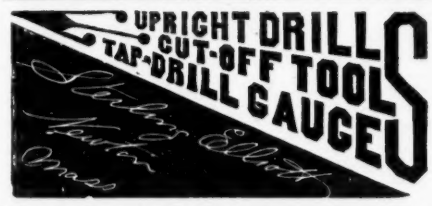

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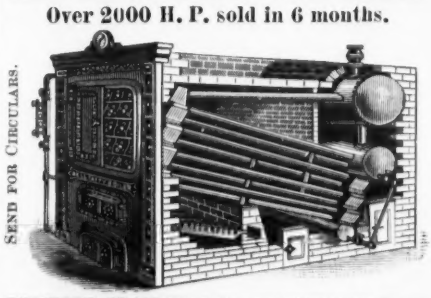

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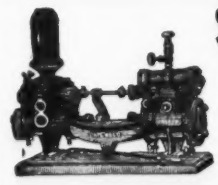

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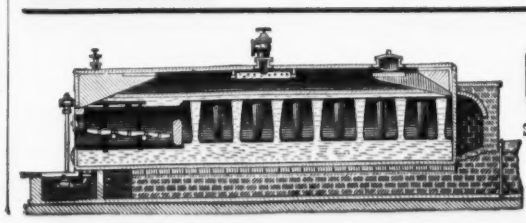

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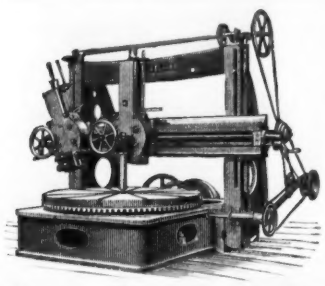

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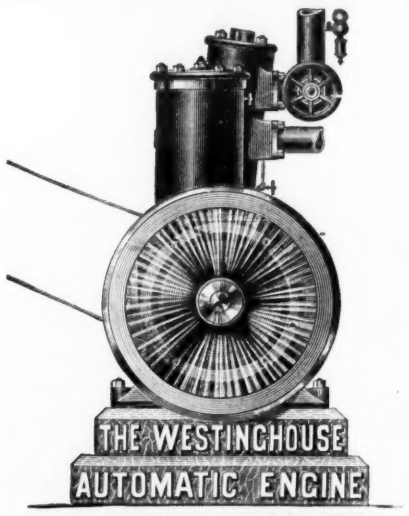

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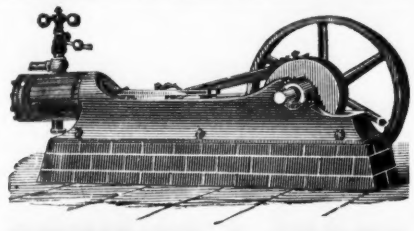

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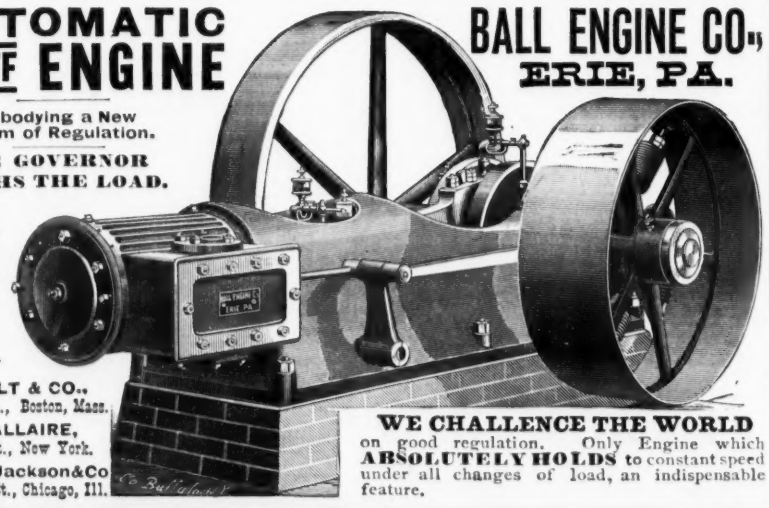

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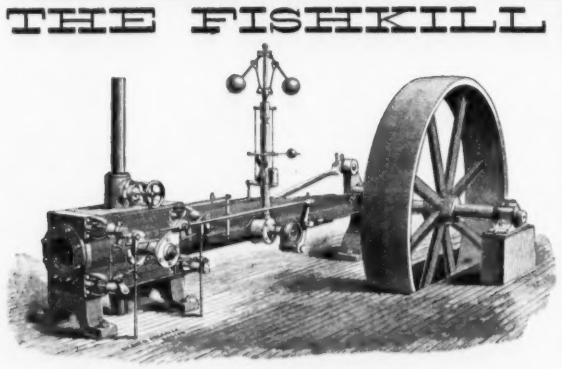

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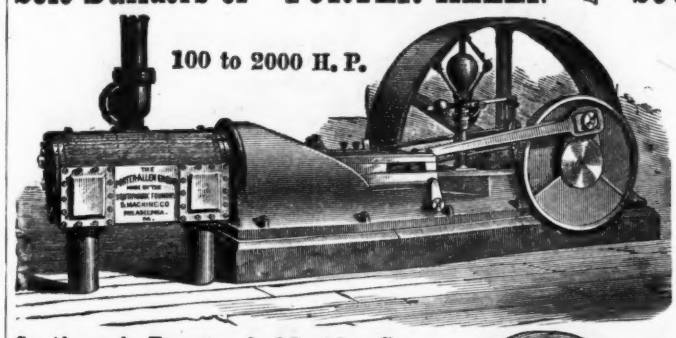

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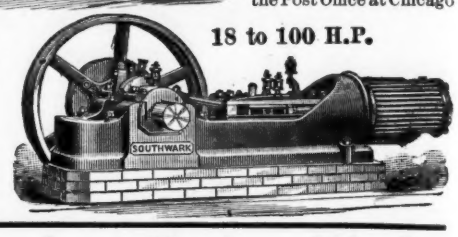

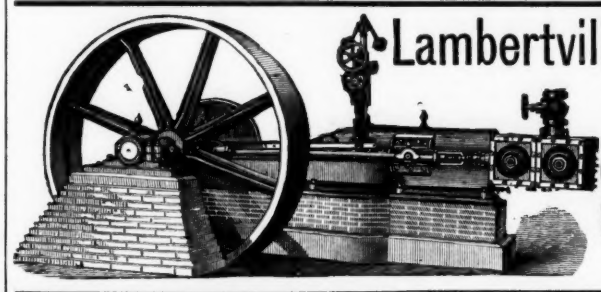

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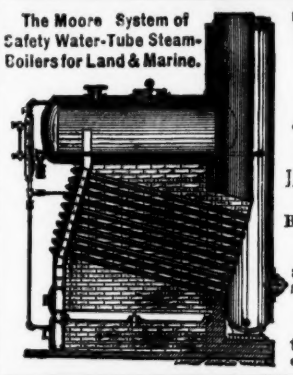

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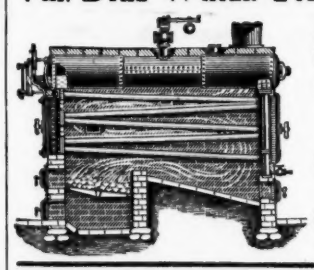

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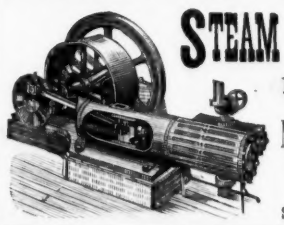

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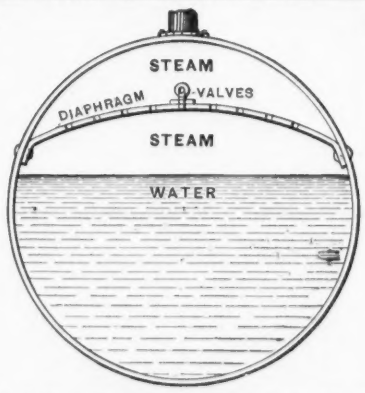

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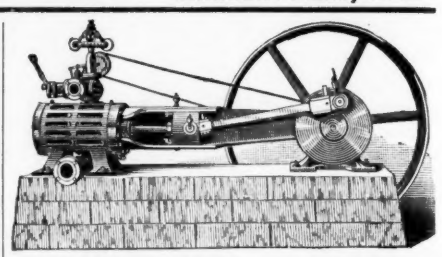

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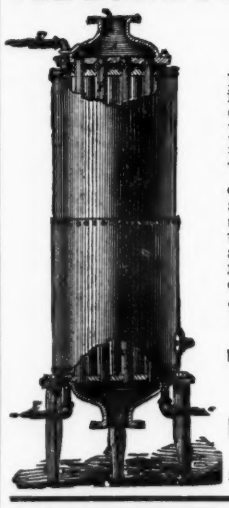

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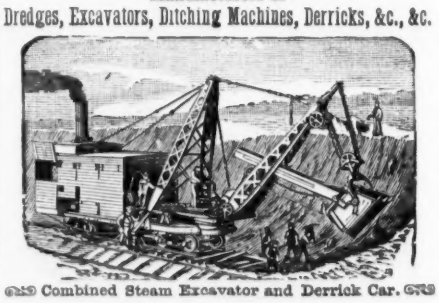

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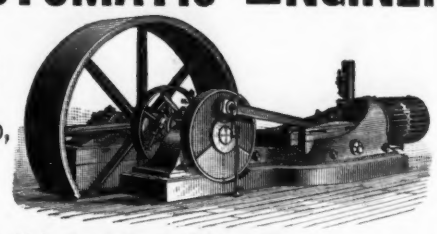

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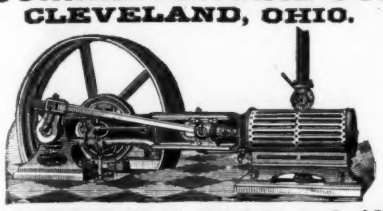

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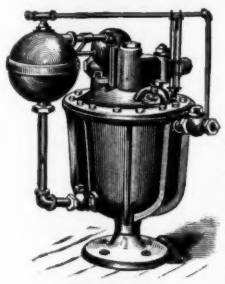

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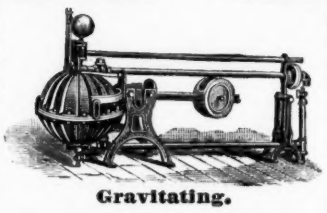

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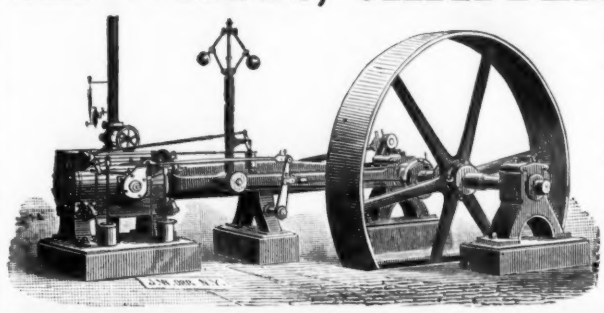

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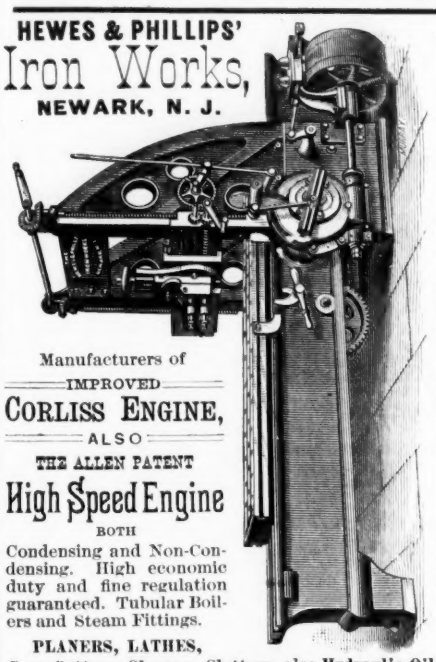

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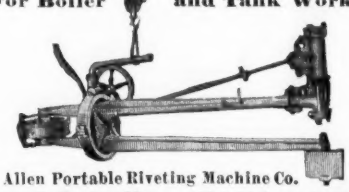

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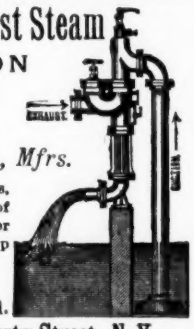

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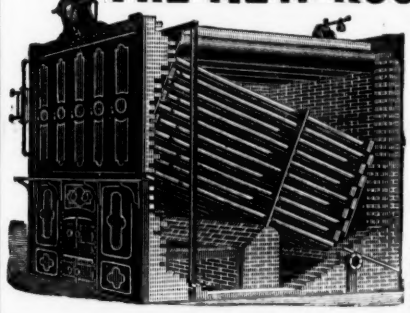

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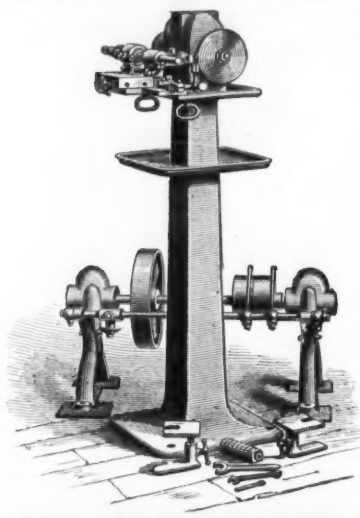

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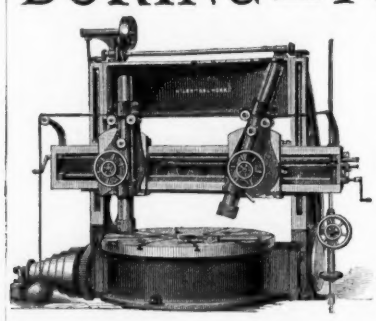

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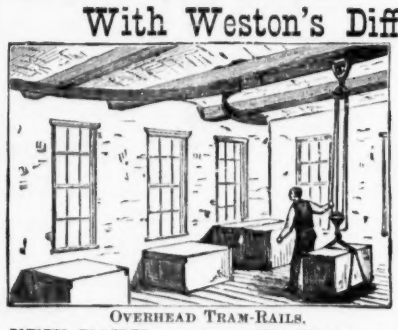

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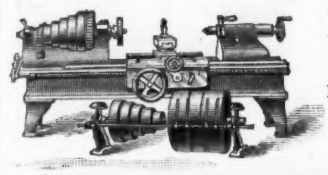

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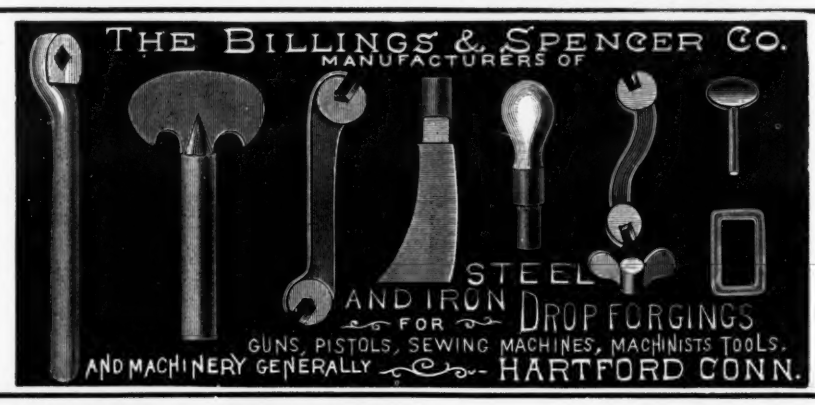

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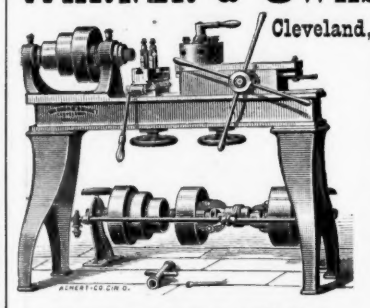

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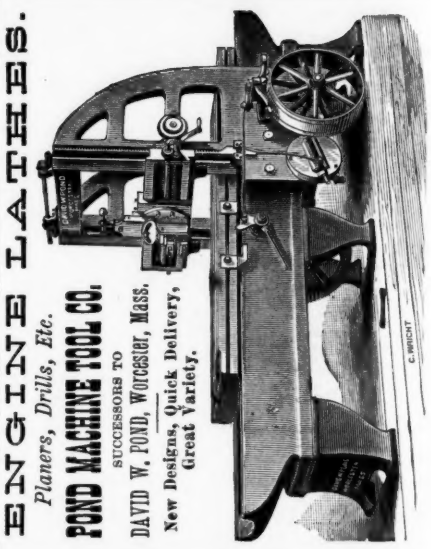

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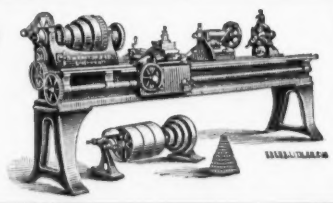

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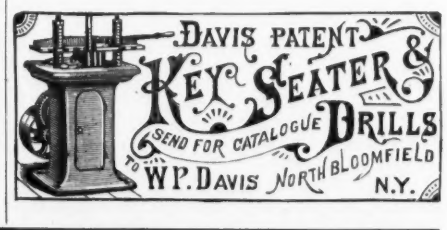

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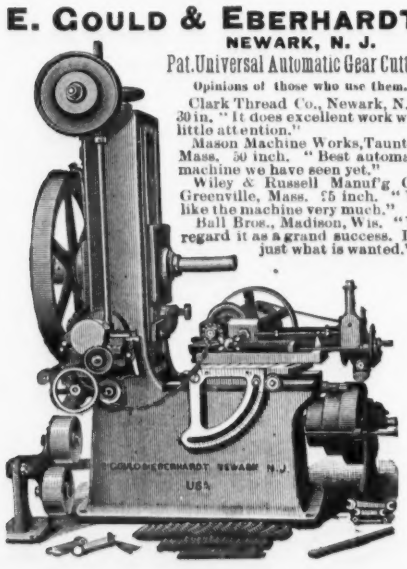

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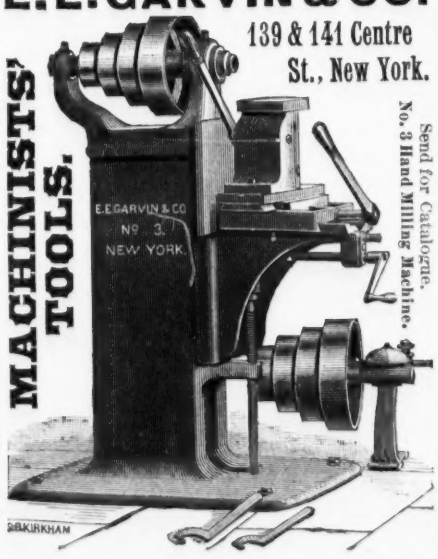

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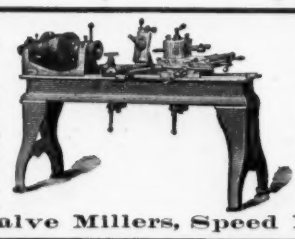

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